

Tabel Momen perlu balok akibat beban kombinasi pada portal as-2

Lantai	No balok	Posisi balok	Momen (KNm)				Momen perlu (KNm)				
			Mati	Hidup	E. kiri	E. kanan	1,2D+1,6L	1,05(D+LR+ ϕ d.e)		0,9(U	
								Ki	Ka		Ki
B M	43	Ki	-64,9486	-23,3342	0	0	-115,273	-87,797	-87,7968	-58,45374	
		Lap	50,3743	18,3326	0	0	89,78132	68,2924	68,2924	45,33687	
		Ka	-82,1082	-30,0006	0	0	-146,5308	-111,41	-111,414	-73,89738	
	49	Ki	-74,082	-28,0888	0	0	-133,8405	-101,38	-101,381	-66,6738	
		Lap	41,4913	16,7999	0	0	76,6694	57,6778	57,6778	37,34217	
		Ka	-73,6552	-28,3115	0	0	-133,6846	-101,12	-101,12	-66,28968	
	55	Ki	-73,2633	-27,9998	0	0	-132,7156	-100,45	-100,446	-65,93697	
		Lap	41,8918	16,8738	0	0	77,26824	58,1604	58,1604	37,70262	
		Ka	-73,673	-28,2527	0	0	-133,6119	-101,09	-101,089	-66,3057	
	61	Ki	-73,6676	-28,1274	0	0	-133,405	-100,98	-100,978	-66,30084	
		Lap	41,8678	16,8596	0	0	77,21672	58,1233	58,1233	37,68102	
		Ka	-73,3167	-28,1535	0	0	-133,0256	-100,63	-100,631	-65,98503	
	67	Ki	-74,0047	-28,4314	0	0	-134,2959	-101,59	-101,587	-66,60423	
		Lap	42,6276	17,2969	0	0	78,82816	59,2884	59,2884	38,36484	
		Ka	-71,46	-26,9748	0	0	-128,9117	-97,692	-97,6918	-64,314	
	73	Ki	-59,5797	-20,0616	0	0	-103,5942	-79,41	-79,4104	-53,62173	
		Lap	30,4849	10,033	0	0	52,63468	40,4369	40,4369	27,43641	
		Ka	-43,1879	-13,3099	0	0	-73,12132	-56,528	-56,5276	-38,86911	
	1	44	Ki	-56,4591	-20,2217	0	0	-100,1056	-76,268	-76,2683	-50,81319
			Lap	54,1278	19,6393	0	0	96,37624	73,3312	73,3312	48,71502
			Ka	-83,0908	-30,4997	0	0	-148,5085	-112,87	-112,865	-74,78172
50		Ki	-75,2863	-28,4298	0	0	-135,8312	-102,93	-102,932	-67,75767	
		Lap	40,9033	16,6342	0	0	75,69868	56,9212	56,9212	36,81297	
		Ka	-73,6269	-28,3017	0	0	-133,635	-101,08	-101,082	-66,26421	
56		Ki	-73,4348	-28,048	0	0	-132,9986	-100,67	-100,667	-66,09132	
		Lap	41,8077	16,8429	0	0	77,11788	58,0461	58,0461	37,62693	
		Ka	-73,6697	-28,2662	0	0	-133,6296	-101,1	-101,097	-66,30273	
62		Ki	-74,3033	-28,331	0	0	-134,4936	-101,82	-101,817	-66,87297	
		Lap	41,8155	16,8293	0	0	77,10548	58,0429	58,0429	37,63395	
		Ka	-72,7856	16,8293	0	0	-60,41584	-62,288	-62,2883	-65,50704	
68		Ki	-73,7398	-28,3455	0	0	-133,8406	-101,24	-101,237	-66,36582	
		Lap	43,2757	17,6458	0	0	80,16412	60,262	60,262	38,94813	
		Ka	-70,4287	-26,363	0	0	-126,6952	-96,095	-96,0951	-63,38583	
74		Ki	-60,0711	-20,4201	0	0	-104,7575	-80,228	-80,2275	-54,06399	
		Lap	32,2054	10,4228	0	0	55,32296	42,5708	42,5708	28,98486	
		Ka	-39,2554	-12,1719	0	0	-66,58152	-51,443	-51,4426	-35,32986	
2		45	Ki	-49,7208	-17,7739	0	0	-88,1032	-67,137	-67,1369	-44,74872
			Lap	56,9284	20,6144	0	0	101,2971	77,0909	77,0909	51,23556
			Ka	-84,2279	-30,9972	0	0	-150,669	-114,48	-114,477	-75,80511
	51	Ki	-75,7436	-28,5475	0	0	-136,5683	-103,51	-103,511	-68,16924	
		Lap	40,5977	16,5584	0	0	75,21068	56,5366	56,5366	36,53793	
		Ka	-73,7808	-28,3357	0	0	-133,8741	-101,27	-101,272	-66,40272	
	57	Ki	-73,6297	-28,1115	0	0	-133,334	-100,92	-100,925	-66,26673	
		Lap	41,4928	16,7322	0	0	76,56288	57,6225	57,6225	37,34352	
		Ka	-74,1045	-28,4241	0	0	-134,404	-101,69	-101,686	-66,69405	
	63	Ki	-74,6095	-28,4373	0	0	-135,0311	-102,23	-102,227	-67,14855	
		Lap	41,9634	16,8732	0	0	77,3532	58,2351	58,2351	37,76706	
		Ka	-72,1836	-27,8164	0	0	-131,1266	-99,159	-99,1586	-64,96524	
	69	Ki	-73,6009	-28,3168	0	0	-133,628	-101,07	-101,067	-66,24081	
		Lap	43,8358	17,9424	0	0	81,3108	61,0992	61,0992	39,45222	
		Ka	-69,4474	-25,7984	0	0	-124,6143	-94,59	-94,5904	-62,50266	
	75	Ki	-60,715	-20,815	0	0	-106,162	-81,235	-81,2354	-54,6435	
		Lap	34,0016	10,8668	0	0	58,1888	44,8298	44,8298	30,60144	
		Ka	-35,0192	-10,8889	0	0	-59,44528	-45,917	-45,9168	-31,51728	

(Sumber : Hasil P

Tabel Momen perlu balok akibat beban kombinasi pada portal as-2 (lanjutan)

Lantai	No balok	Posisi balok	Momen (KNm)				Momen perlu (KNm)			
			Mati	Hidup	E. kiri	E. kanan	1,2D+1,6L	1,05(D+LR+ ϕ d.e)		0,9(D
								Ki	Ka	
3	46	Ki	-25,8529	-9,2214	0	0	-45,77772	-34,892	-34,8915	-23,26761
		Lap	66,8663	24,0926	0	0	118,7877	90,4474	90,4474	60,17967
		Ka	-88,22	-32,5933	0	0	-158,0133	-120,01	-120,009	-79,398
	52	Ki	-82,5562	-30,8384	0	0	-148,4089	-112,59	-112,588	-74,30058
		Lap	37,4685	15,5161	0	0	69,78796	52,3754	52,3754	33,72165
		Ka	-73,2267	-28,1295	0	0	-132,8792	-100,52	-100,517	-65,90403
	58	Ki	-73,7923	-28,2468	0	0	-133,7456	-101,21	-101,209	-66,41307
		Lap	43,4567	17,4472	0	0	80,06356	60,2852	60,2852	39,11103
		Ka	-70,0142	-26,8588	0	0	-126,9911	-96,076	-96,0763	-63,01278
	64	Ki	-80,4637	-30,5914	0	0	-145,5027	-110,18	-110,184	-72,41733
		Lap	40,1482	16,1841	0	0	74,0724	55,7503	55,7503	36,13338
		Ka	-69,9598	-27,0404	0	0	-127,2164	-96,172	-96,1717	-62,96382
	70	Ki	-72,2006	-27,7703	0	0	-131,0732	-99,138	-99,1377	-64,98054
		Lap	45,1522	18,4926	0	0	83,7708	62,9436	62,9436	40,63698
		Ka	-68,2148	-25,2444	0	0	-122,2488	-92,831	-92,8308	-61,39332
	76	Ki	-62,3269	-21,5139	0	0	-109,2145	-83,515	-83,5149	-56,09421
		Lap	35,5066	11,2472	0	0	60,60344	46,7296	46,7296	31,95594
		Ka	-30,3972	-9,4291	0	0	-51,5632	-39,838	-39,8375	-27,35748
4	65	Ki	-22,4628	-8,3729	0	0	-40,352	-30,619	-30,6192	-20,21652
		Lap	62,6962	24,7365	0	0	114,8138	86,6097	86,6097	56,42658
		Ka	-82,8646	-32,1541	0	0	-150,8841	-114,02	-114,017	-74,57814
	71	Ki	-90,9603	-34,7904	0	0	-164,817	-124,73	-124,732	-81,86427
		Lap	40,2237	16,6754	0	0	74,94908	56,2422	56,2422	36,20133
		Ka	-59,3122	-21,8588	0	0	-106,1487	-80,639	-80,6392	-53,38098
	77	Ki	-60,2285	-20,8551	0	0	-105,6424	-80,758	-80,7582	-54,20565
		Lap	36,5205	11,5466	0	0	62,29916	48,0457	48,0457	32,86845
		Ka	-30,468	-9,4891	0	0	-51,74416	-39,962	-39,9622	-27,4212
5	72	Ki	-20,0972	-6,9375	0	0	-35,21664	-26,93	-26,9296	-18,08748
		Lap	29,6008	10,7791	0	0	52,76752	40,1353	40,1353	26,64072
		Ka	-46,7334	-16,5044	0	0	-82,48712	-62,934	-62,9338	-42,06006
	78	Ki	-48,8849	-17,111	0	0	-86,03948	-65,702	-65,7024	-43,99641
		Lap	28,8682	10,6487	0	0	51,67976	39,2565	39,2565	25,98138
		Ka	-19,4109	-6,5916	0	0	-33,83964	-25,918	-25,9184	-17,46981

(Sumber : Hasil P

Tabel Geser perlu balok akibat beban kombinasi pada portal as-2

Lantai	No balok	Posisi balok	Geser (KN)				Geser perlu (KN)				
			Mati	Hidup	E. kiri	E. kanan	1,2D+1,6L	1,05(D+LR+ ϕ d.e)		0,9(I	
								Ki	Ka		Ki
B M	43	Ki	-63,154	-21,389	0	0	-110,0072	-84,278	-84,2785	-56,8386	
		Lap	5,708	1,111	0	0	8,6272	6,92664	6,92664	5,1372	
		Ka	68,874	23,611	0	0	120,4264	92,1509	92,1509	61,9866	
	49	Ki	-63,238	-22,463	0	0	-111,8264	-85,269	-85,2688	-56,9142	
		Lap	-0,071	0,037	0	0	-0,026	-0,0435	-0,04347	-0,0639	
		Ka	63,095	22,537	0	0	111,7732	85,1808	85,1808	56,7855	
	55	Ki	-63,098	-22,458	0	0	-111,6504	-85,118	-85,1176	-56,7882	
		Lap	0,068	0,042	0	0	0,1488	0,10668	0,10668	0,0612	
		Ka	63,235	22,542	0	0	111,9492	85,332	85,332	56,9115	
	61	Ki	-63,225	-22,496	0	0	-111,8636	-85,283	-85,2829	-56,9025	
		Lap	-0,058	0,004361	0	0	-0,062622	-0,0572	-0,05724	-0,0522	
		Ka	63,108	22,504	0	0	111,736	85,1668	85,1668	56,7972	
	67	Ki	-63,591	-22,743	0	0	-112,698	-85,875	-85,8747	-57,2319	
		Lap	-0,424	-0,243	0	0	-0,8976	-0,6493	-0,64932	-0,3816	
		Ka	62,743	22,257	0	0	110,9028	84,576	84,576	56,4687	
	73	Ki	-53,017	-16,594	0	0	-90,1708	-69,607	-69,6068	-47,7153	
		Lap	-0,156	0,281	0	0	0,2624	0,07224	0,07224	-0,1404	
		Ka	42,401	11,531	0	0	69,3308	54,2071	54,2071	38,1609	
	1	44	Ki	-61,576	-20,787	0	0	-107,1504	-82,116	-82,1159	-55,4184
			Lap	7,286	1,713	0	0	11,484	9,08922	9,08922	6,5574
			Ka	70,453	24,213	0	0	123,2844	94,3146	94,3146	63,4077
50		Ki	-63,443	-22,521	0	0	-112,1652	-85,533	-85,5328	-57,0987	
		Lap	-0,277	-0,021	0	0	-0,366	-0,3085	-0,30849	-0,2493	
		Ka	62,89	22,479	0	0	111,4344	84,9169	84,9169	56,601	
56		Ki	-63,127	-22,464	0	0	-111,6948	-85,153	-85,1531	-56,8143	
		Lap	0,039	0,036	0	0	0,1044	0,07119	0,07119	0,0351	
		Ka	63,206	22,536	0	0	111,9048	85,2965	85,2965	56,8854	
62		Ki	-63,42	-22,553	0	0	-112,1888	-85,536	-85,5355	-57,078	
		Lap	-0,253	-0,053	0	0	-0,3884	-0,3102	-0,31017	-0,2277	
		Ka	62,914	22,447	0	0	111,412	84,9152	84,9152	56,6226	
68		Ki	-63,718	-22,83	0	0	-112,9896	-86,081	-86,0811	-57,3462	
		Lap	-0,552	-0,33	0	0	-1,1904	-0,8568	-0,8568	-0,4968	
		Ka	62,615	22,17	0	0	110,61	84,3686	84,3686	56,3535	
74		Ki	-53,755	-16,843	0	0	-91,4548	-70,591	-70,5909	-48,3795	
		Lap	-0,893	0,032	0	0	-1,0204	-0,9108	-0,91077	-0,8037	
		Ka	41,664	11,282	0	0	68,048	53,2241	53,2241	37,4976	
2		45	Ki	-60,263	-20,296	0	0	-104,7892	-80,325	-80,3248	-54,2367
			Lap	2,904	2,204	0	0	7,0112	4,90056	4,90056	2,6136
			Ka	71,765	24,704	0	0	125,6444	96,1046	96,1046	64,5885
	51	Ki	-63,494	-22,535	0	0	-112,2488	-85,598	-85,5981	-57,1446	
		Lap	-0,327	-0,035	0	0	-0,4484	-0,3728	-0,37275	-0,2943	
		Ka	62,839	22,465	0	0	111,3508	84,8516	84,8516	56,5551	
	57	Ki	-63,087	-22,448	0	0	-111,6212	-85,098	-85,0977	-56,7783	
		Lap	0,079	0,052	0	0	0,178	0,12663	0,12663	0,0711	
		Ka	63,246	22,552	0	0	111,9784	85,352	85,352	56,9214	
	63	Ki	-63,571	-22,603	0	0	-112,45	-85,736	-85,7361	-57,2139	
		Lap	-0,404	-0,103	0	0	-0,6496	-0,5107	-0,51072	-0,3636	
		Ka	62,762	22,397	0	0	111,1496	84,7136	84,7136	56,4858	
	69	Ki	-63,859	-22,92	0	0	-113,3028	-86,305	-86,3048	-57,4731	
		Lap	-0,692	-0,42	0	0	-1,5024	-1,0794	-1,0794	-0,6228	
		Ka	62,474	22,08	0	0	110,2968	84,1449	84,1449	56,2266	
	75	Ki	-54,568	-17,123	0	0	-92,8784	-71,68	-71,6797	-49,1112	
		Lap	-1,706	-0,248	0	0	-2,444	-1,9996	-1,99962	-1,5354	
		Ka	40,85	11,002	0	0	66,6232	52,1342	52,1342	36,765	

(Sumber : Hasil P

Tabel Geser perlu balok akibat beban kombinasi pada portal as-2 (lanjutan)

Lantai	No balok	Posisi balok	Geser (KN)				Geser perlu (KN)			
			Mati	Hidup	E. kiri	E. kanan	1,2D+1,6L	1,05(D+LR+0d.e)		0,9(t
								Ki	Ka	
3	46	Ki	-55,62	-18,605	0	0	-96,512	-74,029	-74,0292	-50,058
		Lap	13,242	3,895	0	0	22,1224	17,1759	17,1759	11,9178
		Ka	76,409	26,395	0	0	133,9228	102,401	102,401	68,7681
	52	Ki	-64,722	-22,951	0	0	-114,388	-87,237	-87,2369	-58,2498
		Lap	-1,555	-0,451	0	0	-2,5876	-2,0116	-2,01159	-1,3995
		Ka	61,612	22,049	0	0	109,2128	83,2138	83,2138	55,4508
	58	Ki	-63,796	-22,731	0	0	-112,9248	-86,08	-86,0798	-57,4164
		Lap	-0,63	-0,231	0	0	-1,1256	-0,8555	-0,85554	-0,567
		Ka	62,537	22,269	0	0	110,6748	84,3698	84,3698	56,2833
	64	Ki	-64,917	-23,092	0	0	-114,8476	-87,56	-87,5601	-58,4253
		Lap	-1,751	-0,592	0	0	-3,0484	-2,3358	-2,33583	-1,5759
		Ka	61,416	21,908	0	0	108,752	82,8895	82,8895	55,2744
	70	Ki	-63,831	-22,921	0	0	-113,2708	-86,276	-86,2762	-57,4479
		Lap	-0,664	-0,421	0	0	-1,4704	-1,0508	-1,05084	-0,5976
		Ka	62,502	22,079	0	0	110,3288	84,1735	84,1735	56,2518
	76	Ki	-55,607	-17,483	0	0	-94,7012	-73,073	-73,0731	-50,0463
		Lap	-2,745	-0,608	0	0	-4,2668	-3,393	-3,39297	-2,4705
		Ka	39,811	10,642	0	0	64,8004	50,7408	50,7408	35,8299
4	65	Ki	-53,1	-18,536	0	0	-93,3776	-71,325	-71,3252	-47,79
		Lap	10,067	3,964	0	0	18,4228	13,9001	13,9001	9,0603
		Ka	73,234	26,464	0	0	130,2232	99,1255	99,1255	65,9106
	71	Ki	-68,441	-24,655	0	0	-121,5772	-92,573	-92,5733	-61,5969
		Lap	-5,275	-2,155	0	0	-9,778	-7,349	-7,34895	-4,7475
		Ka	57,892	20,345	0	0	102,0224	77,8764	77,8764	52,1028
	77	Ki	-55,245	-17,363	0	0	-94,0748	-72,592	-72,5922	-49,7205
		Lap	-2,384	-0,488	0	0	-3,6416	-2,9131	-2,91312	-2,1456
		Ka	40,173	10,762	0	0	65,4268	51,2217	51,2217	36,1557
5	72	Ki	-30,701	-9,656	0	0	-52,2908	-40,347	-40,3471	-27,6309
		Lap	4,439	1,594	0	0	7,8772	5,99991	5,99991	3,9951
		Ka	39,58	12,844	0	0	68,0464	52,348	52,348	35,622
	78	Ki	-40,053	-13,003	0	0	-68,8684	-52,978	-52,9782	-36,0477
		Lap	-4,912	-1,753	0	0	-8,6992	-6,6301	-6,63012	-4,4208
		Ka	30,228	9,497	0	0	51,4688	39,7169	39,7169	27,2052

(Sumber : Hasil P

D+E)
Ka
-58,45374
45,33687
-73,89738
-66,6738
37,34217
-66,28968
-65,93697
37,70262
-66,3057
-66,30084
37,68102
-65,98503
-66,60423
38,36484
-64,314
-53,62173
27,43641
-38,86911
-50,81319
48,71502
-74,78172
-67,75767
36,81297
-66,26421
-66,09132
37,62693
-66,30273
-66,87297
37,63395
-65,50704
-66,36582
38,94813
-63,38583
-54,06399
28,98486
-35,32986
-44,74872
51,23556
-75,80511
-68,16924
36,53793
-66,40272
-66,26673
37,34352
-66,69405
-67,14855
37,76706
-64,96524
-66,24081
39,45222
-62,50266
-54,6435
30,60144
-31,51728

erhitungan)

D+E)
Ka
-23,26761
60,17967
-79,398
-74,30058
33,72165
-65,90403
-66,41307
39,11103
-63,01278
-72,41733
36,13338
-62,96382
-64,98054
40,63698
-61,39332
-56,09421
31,95594
-27,35748
-20,21652
56,42658
-74,57814
-81,86427
36,20133
-53,38098
-54,20565
32,86845
-27,4212
-18,08748
26,64072
-42,06006
-43,99641
25,98138
-17,46981
erhitungan)

D+E)
Ka
-56,8386
5,1372
61,9866
-56,9142
-0,0639
56,7855
-56,7882
0,0612
56,9115
-56,9025
-0,0522
56,7972
-57,2319
-0,3816
56,4687
-47,7153
-0,1404
38,1609
-55,4184
6,5574
63,4077
-57,0987
-0,2493
56,601
-56,8143
0,0351
56,8854
-57,078
-0,2277
56,6226
-57,3462
-0,4968
56,3535
-48,3795
-0,8037
37,4976
-54,2367
2,6136
64,5885
-57,1446
-0,2943
56,5551
-56,7783
0,0711
56,9214
-57,2139
-0,3636
56,4858
-57,4731
-0,6228
56,2266
-49,1112
-1,5354
36,765

erhitungan)

D+E)
Ka
-50,058
11,9178
68,7681
-58,2498
-1,3995
55,4508
-57,4164
-0,567
56,2833
-58,4253
-1,5759
55,2744
-57,4479
-0,5976
56,2518
-50,0463
-2,4705
35,8299
-47,79
9,0603
65,9106
-61,5969
-4,7475
52,1028
-49,7205
-2,1456
36,1557
-27,6309
3,9951
35,622
-36,0477
-4,4208
27,2052

erhitungan)

Tabel Momen perlu kolom akibat beban kombinasi pada portal as-2

Lantai	No kolom	Posisi kolom	Momen (KNm)						Momen perlu (KNm)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		arah x
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
B M	1	Atas	39,9294	12,3836	14,3652	3,5026	0	0	70,8996	20,4645	53,9926	15,945	53,9926	15,945	35,93646	11,1452	35,93646
		Bawah	-17,4572	-6,5061	-6,2106	-1,8423	0	0	-30,8856	-10,755	-23,547	-8,37894	-23,547	-8,37894	-15,7115	-5,85549	-15,7115
	7	Atas	-4,9904	-0,3635	-1,1622	-0,8571	0	0	-7,848	-1,80756	-6,21617	-1,10164	-6,2162	-1,10164	-4,49136	-0,32715	-4,49136
		Bawah	3,3791	0,2326	0,9879	0,4577	0	0	5,63556	1,01144	4,37789	0,6287	4,37789	0,6287	3,04119	0,20934	3,04119
	13	Atas	-0,2509	-1,0292	-0,1775	-0,8571	0	0	-0,58508	-2,6064	-0,41255	-1,80062	-0,4125	-1,80062	-0,22581	-0,92628	-0,22581
		Bawah	0,9081	2,315	0,4325	0,4577	0	0	1,78172	3,51032	1,31681	2,81522	1,31681	2,81522	0,81729	2,0835	0,81729
	19	Atas	0,1261	-2,354	-0,0068	-0,84	0	0	0,14044	-4,1688	0,12669	-3,1773	0,12669	-3,1773	0,11349	-2,1186	0,11349
		Bawah	0,5112	1,3418	0,2689	0,4652	0	0	1,04368	2,35448	0,76264	1,79966	0,76264	1,79966	0,46008	1,20762	0,46008
	25	Atas	0,7459	-1,8197	0,3105	-0,7379	0	0	1,39188	-3,36428	1,04402	-2,53052	1,04402	-2,53052	0,67131	-1,63773	0,67131
		Bawah	0,0086	1,1073	0,0398	0,445	0	0	0,074	2,04076	0,04246	1,53647	0,04246	1,53647	0,00774	0,99657	0,00774
	31	Atas	-6,8162	-1,5845	-4,0854	-0,5209	0	0	-14,7161	-2,73484	-10,5887	-2,10128	-10,589	-2,10128	-6,13458	-1,42605	-6,13458
		Bawah	3,3464	1,7681	2,0248	0,6654	0	0	7,25536	3,18636	5,21455	2,41544	5,21455	2,41544	3,01176	1,59129	3,01176
	37	Atas	-25,9013	24,609	-7,9235	8,6216	0	0	-43,7592	43,3254	-33,8521	33,0816	-33,852	33,0816	-23,3112	22,1481	-23,3112
		Bawah	12,1464	-8,3197	3,7771	-2,913	0	0	20,61904	-14,6444	15,9265	-11,1826	15,9265	-11,1826	10,93176	-7,48773	10,93176
1	2	Atas	30,7618	9,1262	11,0266	2,5725	0	0	54,55672	15,0674	41,5622	11,7434	41,5622	11,7434	27,68562	8,21358	27,68562
		Bawah	-25,0192	-7,9105	-8,9691	-2,2337	0	0	-44,3736	-13,0665	-33,8042	-10,1823	-33,804	-10,1823	-22,5173	-7,11945	-22,5173
	8	Atas	-3,8822	-1,1101	-0,9861	-0,9526	0	0	-6,2364	-2,85628	-4,90463	-1,96579	-4,9046	-1,96579	-3,49398	-0,99909	-3,49398
		Bawah	3,0358	0,4692	0,7497	0,6365	0	0	4,84248	1,58144	3,81734	1,02732	3,81734	1,02732	2,73222	0,42228	2,73222
	14	Atas	0,0448	-2,4822	-0,0798	-0,9526	0	0	-0,07392	-4,5028	-0,01999	-3,40649	-0,02	-3,40649	0,04032	-2,23398	0,04032
		Bawah	0,141	1,7634	0,1342	0,6365	0	0	0,38392	3,13448	0,26078	2,38623	0,26078	2,38623	0,1269	1,58706	0,1269
	20	Atas	0,2019	-2,0223	-0,0099	-0,7446	0	0	0,22644	-3,61812	0,20368	-2,74888	0,20368	-2,74888	0,18171	-1,82007	0,18171
		Bawah	0,1315	1,5125	0,1185	0,5405	0	0	0,3474	2,6798	0,23762	2,04215	0,23762	2,04215	0,11835	1,36125	0,11835
	26	Atas	0,3674	-1,2972	0,1291	-0,5604	0	0	0,64744	-2,45328	0,49421	-1,8328	0,49421	-1,8328	0,33066	-1,16748	0,33066
		Bawah	0,0578	1,0739	0,0326	0,4498	0	0	0,12152	2,00836	0,08807	1,50543	0,08807	1,50543	0,05202	0,96651	0,05202
	32	Atas	-5,7766	-1,6169	-3,2785	-0,6215	0	0	-12,1775	-2,93468	-8,81937	-2,21981	-8,8194	-2,21981	-5,19894	-1,45521	-5,19894
		Bawah	5,0641	1,5849	2,8278	0,6012	0	0	10,6014	2,8638	7,69266	2,16915	7,69266	2,16915	4,55769	1,42641	4,55769
	38	Atas	-21,0193	21,64	-6,5213	7,5754	0	0	-35,6572	38,0886	-27,5482	29,0853	-27,548	29,0853	-18,9174	19,476	-18,9174
		Bawah	17,2866	-15,4499	5,3863	-5,4008	0	0	29,362	-27,1812	22,6754	-20,7591	22,6754	-20,7591	15,55794	-13,9049	15,55794

(Sumber : Hasil Pe

Tabel Momen perlu kolom akibat beban kombinasi pada portal as-2(lanjutan)

Lantai	No kolom	Posisi kolom	Momen (KNm)						Momen perlu (KNm)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
2	3	Atas	28,6098	7,7731	10,235	2,1776	0	0	50,70776	12,8119	38,6377	9,99094	38,6377	9,99094	25,74882	6,99579	25,74882
		Bawah	-25,6973	-7,3586	-9,195	-2,0687	0	0	-45,5488	-12,1402	-34,706	-9,46424	-34,706	-9,46424	-23,1276	-6,62274	-23,1276
	9	Atas	-4,2118	-0,246	-1,1588	-0,5504	0	0	-6,90824	-1,17584	-5,39578	-0,72064	-5,3958	-0,72064	-3,79062	-0,2214	-3,79062
		Bawah	3,9223	0,6708	1,0838	0,6879	0	0	6,44084	1,9056	5,02881	1,28218	5,02881	1,28218	3,53007	0,60372	3,53007
	15	Atas	-0,177	-1,4374	-0,1622	-0,5504	0	0	-0,47192	-2,60552	-0,3221	-1,97161	-0,3221	-1,97161	-0,1593	-1,29366	-0,1593
		Bawah	0,2369	1,8436	0,1739	0,6879	0	0	0,56252	3,31296	0,39482	2,51362	0,39482	2,51362	0,21321	1,65924	0,21321
	21	Atas	0,8516	-1,9967	0,213	-0,7394	0	0	1,36272	-3,57908	1,0731	-2,71763	1,0731	-2,71763	0,76644	-1,79703	0,76644
		Bawah	-0,4316	1,9346	-0,0747	0,7035	0	0	-0,63744	3,44712	-0,51593	2,62227	-0,5159	2,62227	-0,38844	1,74114	-0,38844
	27	Atas	0,8377	-1,3012	0,2943	-0,4339	0	0	1,47612	-2,25568	1,1268	-1,73074	1,1268	-1,73074	0,75393	-1,17108	0,75393
		Bawah	-0,5869	1,288	-0,2061	0,4879	0	0	-1,03404	2,32624	-0,78937	1,76224	-0,7894	1,76224	-0,52821	1,1592	-0,52821
33	Atas	-4,9705	-1,2606	-2,9153	-0,5023	0	0	-10,6291	-2,3164	-7,66788	-1,74556	-7,6679	-1,74556	-4,47345	-1,13454	-4,47345	
	Bawah	4,581	1,6481	2,6644	0,6397	0	0	9,76024	3,00124	7,04815	2,26785	7,04815	2,26785	4,1229	1,48329	4,1229	
39	Atas	-20,6793	23,3265	-6,4092	8,1617	0	0	-35,0699	41,0505	-27,097	31,3487	-27,097	31,3487	-18,6114	20,9939	-18,6114	
	Bawah	18,2361	-18,2826	5,6506	-6,3998	0	0	30,92428	-32,1788	23,8944	-24,5726	23,8944	-24,5726	16,41249	-16,4543	16,41249	
3	4	Atas	25,8529	9,5666	9,2214	2,6938	0	0	45,77772	15,79	34,8915	12,3077	34,8915	12,3077	23,26761	8,60994	23,26761
		Bawah	-21,1111	-8,9932	-7,5389	-2,5246	0	0	-37,3956	-14,8312	-28,4993	-11,5635	-28,499	-11,5635	-19	-8,09388	-19
	10	Atas	-5,6639	-3,3047	-1,7549	-1,8197	0	0	-9,60452	-6,87716	-7,42121	-4,99848	-7,4212	-4,99848	-5,09751	-2,97423	-5,09751
		Bawah	4,2725	1,6358	1,2909	1,1496	0	0	7,19244	3,80232	5,57048	2,68325	5,57048	2,68325	3,84525	1,47222	3,84525
	16	Atas	0,5656	-4,9759	0,1173	-1,8197	0	0	0,8664	-8,8826	0,69241	-6,75324	0,69241	-6,75324	0,50904	-4,47831	0,50904
		Bawah	-0,0258	3,0922	0,062	1,1496	0	0	0,06824	5,55	0,02499	4,21247	0,02499	4,21247	-0,02322	2,78298	-0,02322
	22	Atas	-1,0188	-4,3536	-0,4619	-1,6399	0	0	-1,9616	-7,84816	-1,45774	-5,9488	-1,4577	-5,9488	-0,91692	-3,91824	-0,91692
		Bawah	0,3467	2,9872	0,1999	1,1112	0	0	0,73588	5,36256	0,53195	4,06997	0,53195	4,06997	0,31203	2,68848	0,31203
	28	Atas	1,0278	-1,6019	0,3692	-1,3949	0	0	1,82408	-4,15412	1,38932	-2,85371	1,38932	-2,85371	0,92502	-1,44171	0,92502
		Bawah	-0,5796	1,2992	-0,206	0,9001	0	0	-1,02512	2,9992	-0,78162	2,12024	-0,7816	2,12024	-0,52164	1,16928	-0,52164
	34	Atas	-4,1261	-4,0298	-2,2446	-1,581	0	0	-8,54268	-7,36536	-6,21787	-5,55933	-6,2179	-5,55933	-3,71349	-3,62682	-3,71349
		Bawah	3,7619	2,3617	2,0682	0,8934	0	0	7,8234	4,26348	5,68728	3,23024	5,68728	3,23024	3,38571	2,12553	3,38571
40	Atas	-15,633	19,4748	-4,8908	6,8534	0	0	-26,5849	34,3352	-20,5229	26,2054	-20,523	26,2054	-14,0697	17,5273	-14,0697	
	Bawah	14,3399	-16,4254	4,4796	-5,7548	0	0	24,37524	-28,9182	18,8198	-22,0807	18,8198	-22,0807	12,90591	-14,7829	12,90591	

(Sumber : Hasil Pe

Tabel Momen perlu kolom akibat beban kombinasi pada portal as-2 (lanjutan)

Lantai	No kolom	Posisi kolom	Momen (KNm)						Momen perlu (KNm)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		arah x
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
4	23	Atas	22,4628	3,4122	8,3729	3,0227	0	0	40,352	8,93096	30,6192	6,12188	30,6192	6,12188	20,21652	3,07098	20,21652
		Bawah	-11,4683	-4,3158	-4,1945	-1,7878	0	0	-20,4732	-8,03944	-15,5651	-6,03334	-15,565	-6,03334	-10,3215	-3,88422	-10,3215
	29	Atas	-1,7078	9,308	-0,7389	3,8339	0	0	-3,2316	17,3038	-2,41387	12,9939	-2,4139	12,9939	-1,53702	8,3772	-1,53702
		Bawah	-1,2131	-7,5954	-0,3608	-2,6219	0	0	-2,033	-13,3095	-1,57683	-10,1776	-1,5768	-10,1776	-1,09179	-6,83586	-1,09179
	35	Atas	-1,6411	2,4534	-1,4639	2,2922	0	0	-4,31156	6,6116	-2,95283	4,50152	-2,9528	4,50152	-1,47699	2,20806	-1,47699
		Bawah	1,7618	-4,0656	1,4858	-1,542	0	0	4,49144	-7,34592	3,09796	-5,56416	3,09796	-5,56416	1,58562	-3,65904	1,58562
	41	Atas	-15,2693	17,8989	-4,7012	6,0026	0	0	-25,8451	31,0828	-19,9818	23,836	-19,982	23,836	-13,7424	16,109	-13,7424
		Bawah	14,7643	-20,0891	4,5383	-6,9958	0	0	24,97844	-35,3002	19,3147	-26,97	19,3147	-26,97	13,28787	-18,0802	13,28787
5	30	Atas	20,0972	19,3955	6,9375	7,8761	0	0	35,21664	35,8764	26,9296	26,9812	26,9296	26,9812	18,08748	17,456	18,08748
		Bawah	-9,8036	-13,5524	-3,3751	-5,7145	0	0	-17,1645	-25,4061	-13,1289	-19,0302	-13,129	-19,0302	-8,82324	-12,1972	-8,82324
	36	Atas	2,1515	21,9546	0,6066	-4,2073	0	0	3,55236	19,6138	2,76862	19,5182	2,76862	19,5182	1,93635	19,7591	1,93635
		Bawah	-2,5573	-8,7087	-0,4603	-4,2073	0	0	-3,80524	-17,1821	-3,07182	-12,6783	-3,0718	-12,6783	-2,30157	-7,83783	-2,30157
	42	Atas	-19,4109	33,7941	-6,5916	13,5265	0	0	-33,8396	62,1953	-25,9184	46,8461	-25,918	46,8461	-17,4698	30,4147	-17,4698
		Bawah	15,1987	-21,8427	4,7878	-7,9209	0	0	25,89892	-38,8847	19,9804	-29,5884	19,9804	-29,5884	13,67883	-19,6584	13,67883

(Sumber : Hasil Pe

Tabel Geser perlu kolom akibat beban kombinasi pada portal as-2

Lantai	No kolom	posisi kolom	Geser (KN)						Geser perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		arah x
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
B M	1	Atas	-19,129	-6,297	-6,859	-1,782	0	0	-33,9292	-10,4076	-25,847	-8,10873	-25,847	-8,10873	-17,2161	-5,6673	-17,2161
		Bawah	-19,129	-6,297	-6,859	-1,782	0	0	-33,9292	-10,4076	-25,847	-8,10873	-25,847	-8,10873	-17,2161	-5,6673	-17,2161
	7	Atas	2,79	0,199	0,717	0,438	0	0	4,4952	0,9396	3,53178	0,57687	3,53178	0,57687	2,511	0,1791	2,511
		Bawah	2,79	0,199	0,717	0,438	0	0	4,4952	0,9396	3,53178	0,57687	3,53178	0,57687	2,511	0,1791	2,511
	13	Atas	0,386	1,115	0,203	0,438	0	0	0,788	2,0388	0,57582	1,53867	0,57582	1,53867	0,3474	1,0035	0,3474
		Bawah	0,386	1,115	0,203	0,438	0	0	0,788	2,0388	0,57582	1,53867	0,57582	1,53867	0,3474	1,0035	0,3474
	19	Atas	0,128	1,232	0,092	0,435	0	0	0,3008	2,1744	0,21168	1,659	0,21168	1,659	0,1152	1,1088	0,1152
		Bawah	0,128	1,232	0,092	0,435	0	0	0,3008	2,1744	0,21168	1,659	0,21168	1,659	0,1152	1,1088	0,1152
	25	Atas	-0,246	0,976	-0,09	0,394	0	0	-0,4392	1,8016	-0,3339	1,35576	-0,3339	1,35576	-0,2214	0,8784	-0,2214
		Bawah	-0,246	0,976	-0,09	0,394	0	0	-0,4392	1,8016	-0,3339	1,35576	-0,3339	1,35576	-0,2214	0,8784	-0,2214
	31	Atas	3,388	1,118	2,037	0,395	0	0	7,3248	1,9736	5,26848	1,5057	5,26848	1,5057	3,0492	1,0062	3,0492
		Bawah	3,388	1,118	2,037	0,395	0	0	7,3248	1,9736	5,26848	1,5057	5,26848	1,5057	3,0492	1,0062	3,0492
	37	Atas	12,683	-10,976	3,9	-3,845	0	0	21,4596	-19,3232	16,5932	-14,7546	16,5932	-14,7546	11,4147	-9,8784	11,4147
		Bawah	12,683	-10,976	3,9	-3,845	0	0	21,4596	-19,3232	16,5932	-14,7546	16,5932	-14,7546	11,4147	-9,8784	11,4147
1	2	Atas	-13,945	-4,259	-4,999	-1,202	0	0	-24,7324	-7,034	-18,8414	-5,48163	-18,841	-5,48163	-12,5505	-3,8331	-12,5505
		Bawah	-13,945	-4,259	-4,999	-1,202	0	0	-24,7324	-7,034	-18,8414	-5,48163	-18,841	-5,48163	-12,5505	-3,8331	-12,5505
	8	Atas	1,729	0,395	0,434	0,397	0	0	2,7692	1,1092	2,18001	0,74823	2,18001	0,74823	1,5561	0,3555	1,5561
		Bawah	1,729	0,395	0,434	0,397	0	0	2,7692	1,1092	2,18001	0,74823	2,18001	0,74823	1,5561	0,3555	1,5561
	14	Atas	0,024	1,061	0,053	0,397	0	0	0,1136	1,9084	0,06972	1,44753	0,06972	1,44753	0,0216	0,9549	0,0216
		Bawah	0,024	1,061	0,053	0,397	0	0	0,1136	1,9084	0,06972	1,44753	0,06972	1,44753	0,0216	0,9549	0,0216
	20	Atas	-0,018	0,884	0,032	0,321	0	0	0,0296	1,5744	0,00798	1,19784	0,00798	1,19784	-0,0162	0,7956	-0,0162
		Bawah	-0,018	0,884	0,032	0,321	0	0	0,0296	1,5744	0,00798	1,19784	0,00798	1,19784	-0,0162	0,7956	-0,0162
	26	Atas	-0,077	0,593	-0,024	0,253	0	0	-0,1308	1,1164	-0,10101	0,83517	-0,101	0,83517	-0,0693	0,5337	-0,0693
		Bawah	-0,077	0,593	-0,024	0,253	0	0	-0,1308	1,1164	-0,10101	0,83517	-0,101	0,83517	-0,0693	0,5337	-0,0693
	32	Atas	2,71	0,8	1,527	0,306	0	0	5,6952	1,4496	4,12818	1,09704	4,12818	1,09704	2,439	0,72	2,439
		Bawah	2,71	0,8	1,527	0,306	0	0	5,6952	1,4496	4,12818	1,09704	4,12818	1,09704	2,439	0,72	2,439
	38	Atas	9,576	-9,272	2,977	-3,244	0	0	16,2544	-16,3168	12,5555	-12,4606	12,5555	-12,4606	8,6184	-8,3448	8,6184
		Bawah	9,576	-9,272	2,977	-3,244	0	0	16,2544	-16,3168	12,5555	-12,4606	12,5555	-12,4606	8,6184	-8,3448	8,6184

(Sumber : Hasil Pe

Tabel Geser perlu kolom akibat beban kombinasi pada ortas-2 (lanjutan)

Lantai	No kolom	posisi kolom	Geser (KN)						Geser perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		arah x
							arah x	arah y			arah x	arah y	arah x	arah y			
2	3	Atas	-15,085	-4,203	-5,397	-1,18	0	0	-26,7372	-6,9316	-20,3727	-5,40435	-20,373	-5,40435	-13,5765	-3,7827	-13,5765
		Bawah	-15,085	-4,203	-5,397	-1,18	0	0	-26,7372	-6,9316	-20,3727	-5,40435	-20,373	-5,40435	-13,5765	-3,7827	-13,5765
	9	Atas	2,259	0,255	0,623	0,344	0	0	3,7076	0,8564	2,89527	0,55671	2,89527	0,55671	2,0331	0,2295	2,0331
		Bawah	2,259	0,255	0,623	0,344	0	0	3,7076	0,8564	2,89527	0,55671	2,89527	0,55671	2,0331	0,2295	2,0331
	15	Atas	0,115	0,911	0,093	0,344	0	0	0,2868	1,6436	0,19887	1,24551	0,19887	1,24551	0,1035	0,8199	0,1035
		Bawah	0,115	0,911	0,093	0,344	0	0	0,2868	1,6436	0,19887	1,24551	0,19887	1,24551	0,1035	0,8199	0,1035
	21	Atas	-0,356	1,092	-0,08	0,401	0	0	-0,5552	1,952	-0,441	1,48344	-0,441	1,48344	-0,3204	0,9828	-0,3204
		Bawah	-0,356	1,092	-0,08	0,401	0	0	-0,5552	1,952	-0,441	1,48344	-0,441	1,48344	-0,3204	0,9828	-0,3204
	27	Atas	-0,396	0,719	-0,139	0,256	0	0	-0,6976	1,2724	-0,53256	0,96999	-0,5326	0,96999	-0,3564	0,6471	-0,3564
		Bawah	-0,396	0,719	-0,139	0,256	0	0	-0,6976	1,2724	-0,53256	0,96999	-0,5326	0,96999	-0,3564	0,6471	-0,3564
33	Atas	2,653	0,808	1,55	0,317	0	0	5,6636	1,4768	4,08765	1,11468	4,08765	1,11468	2,3877	0,7272	2,3877	
	Bawah	2,653	0,808	1,55	0,317	0	0	5,6636	1,4768	4,08765	1,11468	4,08765	1,11468	2,3877	0,7272	2,3877	
39	Atas	10,81	-11,558	3,35	-4,045	0	0	18,332	-20,3416	14,1645	-15,5337	14,1645	-15,5337	9,729	-10,4022	9,729	
	Bawah	10,81	-11,558	3,35	-4,045	0	0	18,332	-20,3416	14,1645	-15,5337	14,1645	-15,5337	9,729	-10,4022	9,729	
3	4	Atas	-13,046	-5,155	-4,656	-1,45	0	0	-23,1048	-8,506	-17,6093	-6,63075	-17,609	-6,63075	-11,7414	-4,6395	-11,7414
		Bawah	-13,046	-5,155	-4,656	-1,45	0	0	-23,1048	-8,506	-17,6093	-6,63075	-17,609	-6,63075	-11,7414	-4,6395	-11,7414
	10	Atas	2,76	1,372	0,846	0,825	0	0	4,6656	2,9664	3,60864	2,1336	3,60864	2,1336	2,484	1,2348	2,484
		Bawah	2,76	1,372	0,846	0,825	0	0	4,6656	2,9664	3,60864	2,1336	3,60864	2,1336	2,484	1,2348	2,484
	16	Atas	-0,164	2,241	-0,015	0,825	0	0	-0,2208	4,0092	-0,1848	3,04605	-0,1848	3,04605	-0,1476	2,0169	-0,1476
		Bawah	-0,164	2,241	-0,015	0,825	0	0	-0,2208	4,0092	-0,1848	3,04605	-0,1848	3,04605	-0,1476	2,0169	-0,1476
	22	Atas	0,379	2,039	0,184	0,764	0	0	0,7492	3,6692	0,55251	2,78271	0,55251	2,78271	0,3411	1,8351	0,3411
		Bawah	0,379	2,039	0,184	0,764	0	0	0,7492	3,6692	0,55251	2,78271	0,55251	2,78271	0,3411	1,8351	0,3411
	28	Atas	-0,446	0,806	-0,16	0,638	0	0	-0,7912	1,988	-0,6027	1,38222	-0,6027	1,38222	-0,4014	0,7254	-0,4014
		Bawah	-0,446	0,806	-0,16	0,638	0	0	-0,7912	1,988	-0,6027	1,38222	-0,6027	1,38222	-0,4014	0,7254	-0,4014
	34	Atas	2,191	1,775	1,198	0,687	0	0	4,546	3,2292	3,30687	2,44083	3,30687	2,44083	1,9719	1,5975	1,9719
		Bawah	2,191	1,775	1,198	0,687	0	0	4,546	3,2292	3,30687	2,44083	3,30687	2,44083	1,9719	1,5975	1,9719
40	Atas	8,326	-9,972	2,603	-3,502	0	0	14,156	-17,5696	10,9288	-13,4123	10,9288	-13,4123	7,4934	-8,9748	7,4934	
	Bawah	8,326	-9,972	2,603	-3,502	0	0	14,156	-17,5696	10,9288	-13,4123	10,9288	-13,4123	7,4934	-8,9748	7,4934	

(Sumber : Hasil Pe

Tabel Geser perlu kolom akibat beban kombinasi pada ortal as-2 (lanjutan)

Lantai	No kolom	posisi kolom	Geser (KN)						Geser perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		arah x
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
4	23	Atas	-9,425	-2,147	-3,491	-1,336	0	0	-16,8956	-4,714	-12,8287	-3,37659	-12,829	-3,37659	-8,4825	-1,9323	-8,4825
		Bawah	-9,425	-2,147	-3,491	-1,336	0	0	-16,8956	-4,714	-12,8287	-3,37659	-12,829	-3,37659	-8,4825	-1,9323	-8,4825
	29	Atas	0,137	-4,695	0,105	-1,793	0	0	0,3324	-8,5028	0,23205	-6,43587	0,23205	-6,43587	0,1233	-4,2255	0,1233
		Bawah	0,137	-4,695	0,105	-1,793	0	0	0,3324	-8,5028	0,23205	-6,43587	0,23205	-6,43587	0,1233	-4,2255	0,1233
	35	Atas	2,191	-1,811	1,198	-1,065	0	0	4,546	-3,8772	3,30687	-2,79615	3,30687	-2,79615	1,9719	-1,6299	1,9719
		Bawah	2,191	-1,811	1,198	-1,065	0	0	4,546	-3,8772	3,30687	-2,79615	3,30687	-2,79615	1,9719	-1,6299	1,9719
	41	Atas	8,343	-10,552	2,567	-3,611	0	0	14,1188	-18,44	10,9164	-14,1128	10,9164	-14,1128	7,5087	-9,4968	7,5087
		Bawah	8,343	-10,552	2,567	-3,611	0	0	14,1188	-18,44	10,9164	-14,1128	10,9164	-14,1128	7,5087	-9,4968	7,5087
5	30	Atas	-8,306	-9,152	-2,865	-3,775	0	0	-14,5512	-17,0224	-11,1279	-12,7806	-11,128	-12,7806	-7,4754	-8,2368	-7,4754
		Bawah	-8,306	-9,152	-2,865	-3,775	0	0	-14,5512	-17,0224	-11,1279	-12,7806	-11,128	-12,7806	-7,4754	-8,2368	-7,4754
	36	Atas	-1,308	-8,518	-0,296	-3,202	0	0	-2,0432	-15,3448	-1,62204	-11,6336	-1,622	-11,6336	-1,1772	-7,6662	-1,1772
		Bawah	-1,308	-8,518	-0,296	-3,202	0	0	-2,0432	-15,3448	-1,62204	-11,6336	-1,622	-11,6336	-1,1772	-7,6662	-1,1772
	42	Atas	9,614	-15,455	3,161	-5,958	0	0	16,5944	-28,0788	12,7499	-21,2325	12,7499	-21,2325	8,6526	-13,9095	8,6526
		Bawah	9,614	-15,455	3,161	-5,958	0	0	16,5944	-28,0788	12,7499	-21,2325	12,7499	-21,2325	8,6526	-13,9095	8,6526

(Sumber : Hasil Pe

Tabel Aksial perlu kolom akibat beban kombinasi pada portal as-2

Lantai	No kolom	Posisi kolom	Aksial (KN)						Aksial perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
B M	1	Atas	453,5514	453,5514	180	180	0	0	832,2617	832,262	627,429	627,429	627,429	627,429	408,1963	408,196	408,1963
		Bawah	467,0514	467,0514	180	180	0	0	848,4617	848,462	641,604	641,604	641,604	641,604	420,3463	420,346	420,3463
	7	Atas	819,381	819,381	360	360	0	0	1559,257	1559,26	1162,75	1162,75	1162,75	1162,75	737,4429	737,443	737,4429
		Bawah	832,881	832,881	360	360	0	0	1575,457	1575,46	1176,93	1176,93	1176,93	1176,93	749,5929	749,593	749,5929
	13	Atas	819,381	819,381	360	360	0	0	1559,257	1559,26	1162,75	1162,75	1162,75	1162,75	737,4429	737,443	737,4429
		Bawah	832,881	832,881	360	360	0	0	1575,457	1575,46	1176,93	1176,93	1176,93	1176,93	749,5929	749,593	749,5929
	19	Atas	830,8222	830,8222	450	450	0	0	1716,987	1716,99	1250,36	1250,36	1250,36	1250,36	747,74	747,74	747,74
		Bawah	944,3222	944,3222	450	450	0	0	1853,187	1853,19	1369,54	1369,54	1369,54	1369,54	849,89	849,89	849,89
	25	Atas	970,2066	970,2066	416,25	416,25	0	0	1830,248	1830,25	1368,37	1368,37	1368,37	1368,37	873,1859	873,186	873,1859
		Bawah	983,7066	983,7066	416,25	416,25	0	0	1846,448	1846,45	1382,54	1382,54	1382,54	1382,54	885,3359	885,336	885,3359
	31	Atas	1118,387	1118,387	495	495	0	0	2134,065	2134,06	1590,11	1590,11	1590,11	1590,11	1006,549	1006,55	1006,549
		Bawah	1131,887	1131,887	495	495	0	0	2150,265	2150,26	1604,28	1604,28	1604,28	1604,28	1018,699	1018,7	1018,699
	37	Atas	371,1042	371,1042	135	135	0	0	661,325	661,325	503,059	503,059	503,059	503,059	333,9938	333,994	333,9938
		Bawah	384,6042	384,6042	135	135	0	0	677,525	677,525	517,234	517,234	517,234	517,234	346,1438	346,144	346,1438
1	2	Atas	337,0998	337,0998	135	135	0	0	620,5198	620,52	467,355	467,355	467,355	467,355	303,3898	303,39	303,3898
		Bawah	343,8198	343,8198	135	135	0	0	628,5838	628,584	474,411	474,411	474,411	474,411	309,4378	309,438	309,4378
	8	Atas	611,7114	611,7114	270	270	0	0	1166,054	1166,05	869,097	869,097	869,097	869,097	550,5403	550,54	550,5403
		Bawah	618,4314	618,4314	270	270	0	0	1174,118	1174,12	876,153	876,153	876,153	876,153	556,5883	556,588	556,5883
	14	Atas	611,7114	611,7114	270	270	0	0	1166,054	1166,05	869,097	869,097	869,097	869,097	550,5403	550,54	550,5403
		Bawah	618,4314	618,4314	270	270	0	0	1174,118	1174,12	876,153	876,153	876,153	876,153	556,5883	556,588	556,5883
	20	Atas	723,4718	723,4718	360	360	0	0	1444,166	1444,17	1062,05	1062,05	1062,05	1062,05	651,1246	651,125	651,1246
		Bawah	730,1918	730,1918	360	360	0	0	1452,23	1452,23	1069,1	1069,1	1069,1	1069,1	657,1726	657,173	657,1726
	26	Atas	763,4946	763,4946	326,25	326,25	0	0	1438,194	1438,19	1075,72	1075,72	1075,72	1075,72	687,1451	687,145	687,1451
		Bawah	770,2146	770,2146	326,25	326,25	0	0	1446,258	1446,26	1082,78	1082,78	1082,78	1082,78	693,1931	693,193	693,1931
	32	Atas	918,3954	918,3954	405	405	0	0	1750,074	1750,07	1304,52	1304,52	1304,52	1304,52	826,5559	826,556	826,5559
		Bawah	925,1154	925,1154	405	405	0	0	1758,138	1758,14	1311,57	1311,57	1311,57	1311,57	832,6039	832,604	832,6039
	38	Atas	304,9698	304,9698	112,5	112,5	0	0	545,9638	545,964	414,718	414,718	414,718	414,718	274,4728	274,473	274,4728
		Bawah	311,6898	311,6898	112,5	112,5	0	0	554,0278	554,028	421,774	421,774	421,774	421,774	280,5208	280,521	280,5208

(Sumber : Hasil Pe

Tabel Aksial perlu kolom akibat beban kombinasi pada portal as-2 (lanjutan)

Lantai	No kolom	Posisi kolom	Aksial (KN)						Aksial perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ϕ d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
2	3	Atas	222,8112	222,8112	90	90	0	0	411,3734	411,373	309,552	309,552	309,552	309,552	200,5301	200,53	200,5301
		Bawah	227,3682	227,3682	90	90	0	0	416,8418	416,842	314,337	314,337	314,337	314,337	204,6314	204,631	204,6314
	9	Atas	405,8856	405,8856	180	180	0	0	775,0627	775,063	577,38	577,38	577,38	577,38	365,297	365,297	365,297
		Bawah	410,4426	410,4426	180	180	0	0	780,5311	780,531	582,165	582,165	582,165	582,165	369,3983	369,398	369,3983
	15	Atas	405,8856	405,8856	180	180	0	0	775,0627	775,063	577,38	577,38	577,38	577,38	365,297	365,297	365,297
		Bawah	410,4426	410,4426	180	180	0	0	780,5311	780,531	582,165	582,165	582,165	582,165	369,3983	369,398	369,3983
	21	Atas	517,9652	517,9652	270	270	0	0	1053,558	1053,56	770,663	770,663	770,663	770,663	466,1687	466,169	466,1687
		Bawah	522,5222	522,5222	270	270	0	0	1059,027	1059,03	775,448	775,448	775,448	775,448	470,27	470,27	470,27
	27	Atas	558,3072	558,3072	236,25	236,25	0	0	1047,969	1047,97	784,673	784,673	784,673	784,673	502,4765	502,476	502,4765
		Bawah	562,8642	562,8642	236,25	236,25	0	0	1053,437	1053,44	789,457	789,457	789,457	789,457	506,5778	506,578	506,5778
33	Atas	713,208	713,208	315	315	0	0	1359,85	1359,85	1013,47	1013,47	1013,47	1013,47	641,8872	641,887	641,8872	
	Bawah	717,765	717,765	315	315	0	0	1365,318	1365,32	1018,25	1018,25	1018,25	1018,25	645,9885	645,989	645,9885	
39	Atas	240,9984	240,9984	90	90	0	0	433,1981	433,198	328,648	328,648	328,648	328,648	216,8986	216,899	216,8986	
	Bawah	245,5554	245,5554	90	90	0	0	438,6665	438,666	333,433	333,433	333,433	333,433	220,9999	221	220,9999	
3	4	Atas	109,7316	109,7316	45	45	0	0	203,6779	203,678	153,018	153,018	153,018	153,018	98,75844	98,7584	98,75844
		Bawah	113,0796	113,0796	45	45	0	0	207,6955	207,696	156,534	156,534	156,534	156,534	101,7716	101,772	101,7716
	10	Atas	201,2688	201,2688	90	90	0	0	385,5226	385,523	286,932	286,932	286,932	286,932	181,1419	181,142	181,1419
		Bawah	204,6168	204,6168	90	90	0	0	389,5402	389,54	290,448	290,448	290,448	290,448	184,1551	184,155	184,1551
	16	Atas	201,2688	201,2688	90	90	0	0	385,5226	385,523	286,932	286,932	286,932	286,932	181,1419	181,142	181,1419
		Bawah	204,6168	204,6168	90	90	0	0	389,5402	389,54	290,448	290,448	290,448	290,448	184,1551	184,155	184,1551
	22	Atas	313,3484	313,3484	180	180	0	0	664,0181	664,018	480,216	480,216	480,216	480,216	282,0136	282,014	282,0136
		Bawah	316,6964	316,6964	180	180	0	0	668,0357	668,036	483,731	483,731	483,731	483,731	285,0268	285,027	285,0268
	28	Atas	354,0096	354,0096	146,25	146,25	0	0	658,8115	658,812	494,56	494,56	494,56	494,56	318,6086	318,609	318,6086
		Bawah	357,3576	357,3576	146,25	146,25	0	0	662,8291	662,829	498,075	498,075	498,075	498,075	321,6218	321,622	321,6218
	34	Atas	508,9104	508,9104	225	225	0	0	970,6925	970,692	723,356	723,356	723,356	723,356	458,0194	458,019	458,0194
		Bawah	512,2584	512,2584	225	225	0	0	974,7101	974,71	726,871	726,871	726,871	726,871	461,0326	461,033	461,0326
40	Atas	178,236	178,236	67,5	67,5	0	0	321,8832	321,883	243,848	243,848	243,848	243,848	160,4124	160,412	160,4124	
	Bawah	181,584	181,584	67,5	67,5	0	0	325,9008	325,901	247,363	247,363	247,363	247,363	163,4256	163,426	163,4256	

(Sumber : Hasil Pe

Tabel Aksial perlu kolom akibat beban kombinasi pada portal as-2 (lanjutan)

Lantai	No kolom	Posisi kolom	Aksial (KN)						Aksial perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			Ki		Ka		Ki		K		
			arah x	arah y	arah x	arah y	arah x	arah y	arah x	arah y	arah x	arah y	arah x				
4	23	Atas	109,7316	109,7316	45	45	0	0	203,6779	203,678	153,018	153,018	153,018	153,018	98,75844	98,7584	98,75844
		Bawah	113,0796	113,0796	45	45	0	0	207,6955	207,696	156,534	156,534	156,534	156,534	101,7716	101,772	101,7716
	29	Atas	140,3928	140,3928	56,25	56,25	0	0	258,4714	258,471	194,662	194,662	194,662	194,662	126,3535	126,354	126,3535
		Bawah	143,7408	143,7408	56,25	56,25	0	0	262,489	262,489	198,178	198,178	198,178	198,178	129,3667	129,367	129,3667
	35	Atas	304,2936	304,2936	135	135	0	0	581,1523	581,152	432,908	432,908	432,908	432,908	273,8642	273,864	273,8642
		Bawah	307,6416	307,6416	135	135	0	0	585,1699	585,17	436,424	436,424	436,424	436,424	276,8774	276,877	276,8774
	41	Atas	115,4736	115,4736	45	45	0	0	210,5683	210,568	159,047	159,047	159,047	159,047	103,9262	103,926	103,9262
		Bawah	118,8216	118,8216	45	45	0	0	214,5859	214,586	162,563	162,563	162,563	162,563	106,9394	106,939	106,9394
5	30	Atas	52,7112	52,7112	22,5	22,5	0	0	99,25344	99,2534	74,2468	74,2468	74,2468	74,2468	47,44008	47,4401	47,44008
		Bawah	56,0592	56,0592	22,5	22,5	0	0	103,271	103,271	77,7622	77,7622	77,7622	77,7622	50,45328	50,4533	50,45328
	36	Atas	99,6768	99,6768	45	45	0	0	191,6122	191,612	142,461	142,461	142,461	142,461	89,70912	89,7091	89,70912
		Bawah	103,0248	103,0248	45	45	0	0	195,6298	195,63	145,976	145,976	145,976	145,976	92,72232	92,7223	92,72232
	42	Atas	52,7112	52,7112	22,5	22,5	0	0	99,25344	99,2534	74,2468	74,2468	74,2468	74,2468	47,44008	47,4401	47,44008
		Bawah	56,0592	56,0592	22,5	22,5	0	0	103,271	103,271	77,7622	77,7622	77,7622	77,7622	50,45328	50,4533	50,45328

(Sumber : Hasil Pe

ka
arah y
11,14524
-5,85549
-0,32715
0,20934
-0,92628
2,0835
-2,1186
1,20762
-1,63773
0,99657
-1,42605
1,59129
22,1481
-7,48773
8,21358
-7,11945
-0,99909
0,42228
-2,23398
1,58706
-1,82007
1,36125
-1,16748
0,96651
-1,45521
1,42641
19,476
-13,90491

erhitungan)

ka
arah y
6,99579
-6,62274
-0,2214
0,60372
-1,29366
1,65924
-1,79703
1,74114
-1,17108
1,1592
-1,13454
1,48329
20,99385
-16,45434
8,60994
-8,09388
-2,97423
1,47222
-4,47831
2,78298
-3,91824
2,68848
-1,44171
1,16928
-3,62682
2,12553
17,52732
-14,78286

erhitungan)

ka
arah y
3,07098
-3,88422
8,3772
-6,83586
2,20806
-3,65904
16,10901
-18,08019
17,45595
-12,19716
19,75914
-7,83783
30,41469
-19,65843

erhitungan)

ka
arah y
-5,6673
-5,6673
0,1791
0,1791
1,0035
1,0035
1,1088
1,1088
0,8784
0,8784
1,0062
1,0062
-9,8784
-9,8784
-3,8331
-3,8331
0,3555
0,3555
0,9549
0,9549
0,7956
0,7956
0,5337
0,5337
0,72
0,72
-8,3448
-8,3448

erhitungan)

ka
arah y
-3,7827
-3,7827
0,2295
0,2295
0,8199
0,8199
0,9828
0,9828
0,6471
0,6471
0,7272
0,7272
-10,4022
-10,4022
-4,6395
-4,6395
1,2348
1,2348
2,0169
2,0169
1,8351
1,8351
0,7254
0,7254
1,5975
1,5975
-8,9748
-8,9748

erhitungan)

ka
arah y
-1,9323
-1,9323
-4,2255
-4,2255
-1,6299
-1,6299
-9,4968
-9,4968
-8,2368
-8,2368
-7,6662
-7,6662
-13,9095
-13,9095

erhitungan)

ka
arah y
408,1963
420,3463
737,4429
749,5929
737,4429
749,5929
747,74
849,89
873,1859
885,3359
1006,549
1018,699
333,9938
346,1438
303,3898
309,4378
550,5403
556,5883
550,5403
556,5883
651,1246
657,1726
687,1451
693,1931
826,5559
832,6039
274,4728
280,5208

erhitungan)

ka
arah y
200,5301
204,6314
365,297
369,3983
365,297
369,3983
466,1687
470,27
502,4765
506,5778
641,8872
645,9885
216,8986
220,9999
98,75844
101,7716
181,1419
184,1551
181,1419
184,1551
282,0136
285,0268
318,6086
321,6218
458,0194
461,0326
160,4124
163,4256

erhitungan)

ca
arah y
98,75844
101,7716
126,3535
129,3667
273,8642
276,8774
103,9262
106,9394
47,44008
50,45328
89,70912
92,72232
47,44008
50,45328

erhitungan)

Momen tersedia negatif

lantai	No blk	Psisi blk	T atas	T bawah	Luas	As	As'	b	d	ρ_1	ρ_{maks}	
B M	43	Ki	4D20	3D20	314	1256	942	350	440	0,203896	2,991	
		Lap	3D20	4D20	314	1256	942	350	440	0,203896	2,991	
		Ka	6D20	3D20	314	1884	942	350	420	0,640816	2,991	
	49	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
	55	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
	61	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
	67	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
	73	Ki	4D20	3D20	314	1256	942	350	440	0,203896	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	3D20	3D20	314	942	942	350	440	0	2,991	
	1	44	Ki	4D20	3D20	314	1256	942	350	440	0,203896	2,991
			Lap	3D20	4D20	314	1256	942	350	440	0,203896	2,991
			Ka	6D20	3D20	314	1884	942	350	420	0,640816	2,991
		50	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991
			Lap	3D20	3D20	314	942	942	350	440	0	2,991
			Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991
56		Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
62		Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	3D20	3D20	314	942	942	350	440	0	2,991	
68		Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
74		Ki	4D20	3D20	314	1256	942	350	440	0,203896	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	3D20	3D20	314	942	942	350	440	0	2,991	
2		45	Ki	3D20	3D20	314	942	942	350	440	0	2,991
			Lap	3D20	4D20	314	1256	942	350	440	0,203896	2,991
			Ka	6D20	3D20	314	1884	942	350	420	0,640816	2,991
		51	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991
			Lap	3D20	3D20	314	942	942	350	440	0	2,991
			Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991
	57	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
	63	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
	69	Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
	75	Ki	4D20	3D20	314	1256	942	350	440	0,203896	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	

3	46	Ka	3D20	3D20	314	942	942	350	440	0	2,991	
		Ki	3D20	3D20	314	942	942	350	440	0	2,991	
		Lap	3D20	5D20	314	1570	942	350	440	0,407792	2,991	
	52	Ka	6D20	3D20	314	1884	942	350	420	0,640816	2,991	
		Ki	6D20	3D20	314	1884	942	350	420	0,640816	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
	58	Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Ki	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
	64	Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Ki	6D20	3D20	314	1884	942	350	420	0,640816	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
	70	Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	5D20	3D20	314	1570	942	350	440	0,407792	2,991	
	76	Ki	4D20	3D20	314	1256	942	350	440	0,203896	2,991	
		Lap	3D20	3D20	314	942	942	350	440	0	2,991	
		Ka	3D20	3D20	314	942	942	350	440	0	2,991	
	4	65	Ki	3D20	3D20	314	942	942	350	440	0	2,991
			Lap	3D20	4D20	314	1256	942	350	440	0,203896	2,991
			Ka	6D20	3D20	314	1884	942	350	420	0,640816	2,991
		71	Ki	6D20	3D20	314	1884	942	350	420	0,640816	2,991
			Lap	3D20	3D20	314	942	942	350	440	0	2,991
		77	Ka	4D20	3D20	314	1256	942	350	440	0,203896	2,991
Ki	4D20		3D20	314	1256	942	350	440	0,203896	2,991		
Lap	3D20		3D20	314	942	942	350	440	0	2,991		
5	72	Ka	3D20	3D20	314	942	942	350	440	0	2,991	
		Ki	2D20	2D20	314	628	628	300	340	0	2,991	
		Lap	2D20	3D20	314	942	628	300	340	0,307843	2,991	
	78	Ka	4D20	2D20	314	1256	628	300	340	0,615686	2,991	
		Ki	4D20	2D20	314	1256	628	300	340	0,615686	2,991	
		Lap	2D20	3D20	314	942	628	300	340	0,307843	2,991	
Ka	2D20	2D20	314	628	628	300	340	0	2,991			

0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
26,11917	95,14925	9,569524	4306,286	66,31637	56,74685	60,763025	156,35604	21,75073242
39,17876	95,14925	3,039731	4306,286	65,69266	62,65293	111,59507	163,00309	37,8441187
39,17876	95,14925	3,039731	4306,286	65,69266	62,65293	111,59507	163,00309	37,8441187
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
26,11917	95,14925	9,569524	4306,286	66,31637	56,74685	60,763025	156,35604	21,75073242
26,11917	95,14925	9,569524	4306,286	66,31637	56,74685	60,763025	156,35604	21,75073242
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
26,11917	95,14925	9,569524	4306,286	66,31637	56,74685	60,763025	156,35604	21,75073242
39,17876	95,14925	3,039731	4306,286	65,69266	62,65293	111,59507	163,00309	37,8441187
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
26,11917	95,14925	9,569524	4306,286	66,31637	56,74685	60,763025	156,35604	21,75073242
26,11917	95,14925	9,569524	4306,286	66,31637	56,74685	60,763025	156,35604	21,75073242
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
26,11917	95,14925	9,569524	4306,286	66,31637	56,74685	60,763025	156,35604	21,75073242
13,05959	95,14925	16,09932	4306,286	67,56829	51,46897	5,4670532	142,72294	1,956986356
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
13,05959	95,14925	16,09932	4306,286	67,56829	51,46897	5,4670532	142,72294	1,956986356
39,17876	95,14925	3,039731	4306,286	65,69266	62,65293	111,59507	163,00309	37,8441187
39,17876	95,14925	3,039731	4306,286	65,69266	62,65293	111,59507	163,00309	37,8441187
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
13,05959	95,14925	16,09932	4306,286	67,56829	51,46897	5,4670532	142,72294	1,956986356
13,05959	95,14925	16,09932	4306,286	67,56829	51,46897	5,4670532	142,72294	1,956986356
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
0	95,14925	22,62911	4306,286	69,41442	46,78532	-54,051383	130,46859	-19,348233
0	95,14925	17,60042	3349,333	60,49056	42,89014	-113,45063	78,390697	-19,9491594
15,23618	95,14925	9,982327	3349,333	58,72802	48,74569	-27,747782	88,2741	-4,87917006
30,47237	95,14925	2,364235	3349,333	57,9217	55,55746	49,218894	99,523944	8,654650345
30,47237	95,14925	2,364235	3349,333	57,9217	55,55746	49,218894	99,523944	8,654650345
15,23618	95,14925	9,982327	3349,333	58,72802	48,74569	-27,747782	88,2741	-4,87917006
0	95,14925	17,60042	3349,333	60,49056	42,89014	-113,45063	78,390697	-19,9491594

Mn	Mt ⁽⁻⁾	Mu	
144,67992	115,74394	115,273	115,74394
144,67992	115,74394	0	115,74394
200,84721	160,67777	146,531	160,67777
178,10677	142,48542	133,84	142,48542
111,12036	88,896285	0	88,89628
178,10677	142,48542	133,685	142,48542
178,10677	142,48542	132,716	142,48542
111,12036	88,896285	0	88,89628
178,10677	142,48542	133,612	142,48542
178,10677	142,48542	133,405	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	133,026	142,48542
178,10677	142,48542	134,296	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	128,912	142,48542
144,67992	115,74394	103,594	115,74394
111,12036	88,896285		88,89628
111,12036	88,896285	73,1213	88,89628
144,67992	115,74394	100,106	115,74394
144,67992	115,74394		115,74394
200,84721	160,67777	148,508	160,67777
178,10677	142,48542	135,831	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	133,635	142,48542
178,10677	142,48542	132,999	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	133,63	142,48542
178,10677	142,48542	134,494	142,48542
111,12036	88,896285		88,89628
111,12036	88,896285	60,4158	88,89628
178,10677	142,48542	133,841	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	126,659	142,48542
144,67992	115,74394	104,757	115,74394
111,12036	88,896285	0	88,89628
111,12036	88,896285	66,5815	88,89628
111,12036	88,896285	88,1032	88,89628
144,67992	115,74394	0	115,74394
200,84721	160,67777	150,669	160,67777
178,10677	142,48542	136,568	142,48542
111,12036	88,896285	0	88,89628
178,10677	142,48542	133,874	142,48542
178,10677	142,48542	133,334	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	134,404	142,48542
178,10677	142,48542	135,031	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	131,127	142,48542
178,10677	142,48542	133,628	142,48542
111,12036	88,896285	0	88,89628
178,10677	142,48542	124,614	142,48542
144,67992	115,74394	106,162	115,74394
111,12036	88,896285	0	88,89628

111,12036	88,896285	59,4453	88,89628
111,12036	88,896285	45,7777	88,89628
178,10677	142,48542	0	142,48542
200,84721	160,67777	158,013	160,67777
200,84721	160,67777	148,409	160,67777
111,12036	88,896285	0	88,89628
178,10677	142,48542	132,879	142,48542
178,10677	142,48542	133,746	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	126,991	142,48542
200,84721	160,67777	145,503	160,67777
111,12036	88,896285		88,89628
178,10677	142,48542	127,216	142,48542
178,10677	142,48542	131,073	142,48542
111,12036	88,896285		88,89628
178,10677	142,48542	122,249	142,48542
144,67992	115,74394	109,215	115,74394
111,12036	88,896285	0	88,89628
111,12036	88,896285	51,5632	88,89628
111,12036	88,896285	40,352	88,89628
144,67992	115,74394	0	115,74394
200,84721	160,67777	150,884	160,67777
200,84721	160,67777	160,3817	160,67777
111,12036	88,896285	0	88,89628
144,67992	115,74394	106,149	115,74394
144,67992	115,74394	105,642	115,74394
111,12036	88,896285	0	88,89628
111,12036	88,896285	51,7442	88,89628
58,441537	46,75323	35,2166	46,75323
83,39493	66,715944	0	66,71594
108,17859	86,542875	82,4871	86,542875
108,17859	86,542875	86,0395	86,542875
83,39493	66,715944	0	66,71594
58,441537	46,75323	33,8396	46,75323

164,817

Tabel VII.12 Perbandingan dan nilai banding dimensi kolom portal as-2

Lantai	No kolom	Dimensi kolom		Nilai banding
		Terpasang di lapangan	Hasil hitungan	
BM	1	500/500	500/500	1
	7	500/500	500/500	1
	13	500/500	500/500	1
	19	500/500	500/500	1
	25	500/500	500/500	1
	31	500/500	500/500	1
	37	500/500	500/500	1
1	2	400/400	400/400	1
	8	400/400	400/400	1
	14	400/400	400/400	1
	20	400/400	400/400	1
	26	400/400	400/400	1
	32	400/400	400/400	1
	38	400/400	400/400	1
2	3	350/350	350/350	1
	9	350/350	350/350	1
	15	350/350	350/350	1
	21	350/350	350/350	1
	27	350/350	350/350	1
	33	350/350	350/350	1
	39	350/350	350/350	1
3	4	300/300	300/300	1
	10	300/300	300/300	1
	16	300/300	300/300	1
	22	300/300	300/300	1
	28	300/300	300/300	1
	34	300/300	300/300	1
4	40	300/300	300/300	1
	23	300/300	300/300	1
	29	300/300	300/300	1
	35	300/300	300/300	1
5	41	300/300	300/300	1
	30	300/300	300/300	1
	36	300/300	300/300	1
	42	300/300	300/300	1

(Sumber : Hasil Hitungan)

Tabel V.7. Panjang penyaluran portal as-2

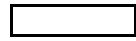
Lantai	No. balok	Posisi balok	Momen tersedia (KNm)		$A_{s,perlu}$ (mm ²)		L_d (mm)		
			Negatif	Positif	Negatif	Positif	Negatif	Positif	
B M	43	Ki	115,74394	115,74394	1250,1602	774,42528	514,1981	424,7007	
		Ka	160,67777	160,67777	1619,1722	776,0992	443,9832	425,5187	
	49	Ki	142,48542	142,48542	1467,5481	774,42528	482,8888	424,7007	
		Ka	142,48542	142,48542	1465,7118	774,42528	482,2845	424,7007	
	55	Ki	142,48542	142,48542	1454,2407	774,42528	478,51	424,7007	
		Ka	142,48542	142,48542	1464,8472	774,42528	482	424,7007	
	61	Ki	142,48542	142,48542	1462,3957	774,42528	481,1934	424,7007	
		Ka	142,48542	142,48542	1457,9089	774,42528	479,717	424,7007	
	67	Ki	142,48542	142,48542	1472,9524	774,42528	484,667	424,7007	
		Ka	142,48542	142,48542	1409,3472	774,42528	463,7381	424,7007	
	73	Ki	115,74394	115,74394	1115,9772	774,42528	459,0078	424,7007	
		Ka	88,89628	88,89628	774,51136	774,42528	424,748	424,7007	
	1	44	Ki	115,74394	115,74394	1076,2701	774,42528	590,2347	424,7007
			Ka	160,67777	160,67777	1643,0237	786,9909	486,0946	431,5918
50		Ki	142,48542	142,48542	1491,168	774,42528	522,6337	424,7007	
		Ka	142,48542	142,48542	1465,1196	774,42528	482,0897	424,7007	
56		Ki	142,48542	142,48542	1457,5894	774,42528	479,6119	424,7007	
		Ka	142,48542	142,48542	1465,0604	774,42528	483,0702	424,7007	
62		Ki	142,48542	142,48542	1475,3	774,42528	485,4395	424,7007	
		Ka	88,89628	88,89628	774,42528	774,42528	424,7007	424,7007	
68		Ki	142,48542	142,48542	1467,5599	774,42528	482,8926	424,7007	
		Ka	142,48542	142,48542	1382,864	774,42528	455,0239	424,7007	
74		Ki	115,74394	115,74394	1129,2537	774,42528	464,4685	424,7007	
		Ka	88,89628	88,89628	774,42528	774,42528	424,7007	424,7007	
2		45	Ki	88,89628	88,89628	940,88111	774,42528	515,9864	424,7007
			Ka	160,67777	160,67777	1669,1682	798,9102	457,6923	438,1285
	51	Ki	142,48542	142,48542	1499,9269	774,42528	493,5428	424,7007	
		Ka	142,48542	142,48542	1467,9509	774,42528	483,0213	424,7007	
	57	Ki	142,48542	142,48542	1461,555	774,42528	480,9168	424,7007	
		Ka	142,48542	142,48542	1474,2328	774,42528	485,0883	424,7007	
	63	Ki	142,48542	142,48542	1481,67	774,42528	487,5355	424,7007	
		Ka	142,48542	142,48542	1435,4611	774,42528	472,3307	424,7007	
	69	Ki	142,48542	142,48542	1465,0367	774,42528	482,0624	424,7007	
		Ka	142,48542	142,48542	1358,8867	774,42528	447,1343	424,7007	
	75	Ki	115,74394	115,74394	1145,3179	774,42528	471,0758	424,7007	
		Ka	88,89628	88,89628	774,42528	774,42528	424,7007	424,7007	
	3	46	Ki	88,89628	88,89628	774,42528	774,42528	424,7007	424,7007
			Ka	160,67777	160,67777	1758,5974	839,5259	482,2141	460,4024
52		Ki	160,67777	160,67777	1641,8278	786,4452	450,1955	431,2926	
		Ka	142,48542	142,48542	1456,1963	774,42528	479,1535	424,7007	
58		Ki	142,48542	142,48542	1466,4345	774,42528	482,5223	424,7007	
		Ka	142,48542	142,48542	1386,7595	774,42528	456,3057	424,7007	
64		Ki	160,67777	160,67777	1606,7949	774,42528	440,5893	424,7007	
		Ka	142,48542	142,48542	1389,4023	774,42528	457,1753	424,7007	
70		Ki	142,48542	142,48542	1434,8235	774,42528	472,1209	424,7007	
		Ka	142,48542	142,48542	1331,2379	774,42528	438,0366	424,7007	
76		Ki	115,74394	115,74394	1180,3191	774,42528	485,472	424,7007	
		Ka	88,89628	88,89628	774,42528	774,42528	424,7007	424,7007	

(Sumber : Hasil Perhitungan)

Tabel V.7. Panjang penyaluran portal as-2 (lanjutan)

Lantai	No. balok	Posisi balok	Momen tersedia (KNm)		$A_{s,perlu}$ (mm ²)		L_d (mm)	
			Negatif	Positif	Negatif	Positif	Negatif	Positif
4	65	Ki	88,89628	88,89628	774,42528	774,42528	424,7007	424,7007
		Ka	160,67777	160,67777	1671,7735	800,0968	458,4067	438,7792
	71	Ki	160,67777	160,67777	1842,2678	877,307	505,1569	481,1219
		Ka	115,74394	115,74394	1145,1691	774,42528	471,0146	424,7007
	77	Ki	115,74394	115,74394	1139,3692	774,42528	468,6291	424,7007
		Ka	88,89628	88,89628	774,42528	774,42528	424,7007	424,7007
5	72	Ki	46,75323	46,75323	512,931034	512,931034	421,9429	421,9429
		Ka	86,542875	86,542875	1005,8863	662,2503	413,7268	544,7747
	78	Ki	86,542875	86,542875	1053,0215	692,08718	433,1138	569,3188
		Ka	46,75323	46,75323	512,931034	512,931034	421,9429	421,9429

(Sumber : Hasil Perhitungan)



Tabel V. 11 Penulangan memanjang kolom portal as-2

Lantai	No kolom	Mu (KNm)		Pu (KN)		Mutu (Mpa)		b (mm)	h (mm)	d (mm)	Tulangan		Luas perlu (mm ²)	
		Arah X	Arah Y	Arah X	Arah Y	Beton	Baja				Arah X	Arah Y	Arah X	Arah Y
B M	1	70,8996	20,46448	467,0514	467,0514	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	7	7,848	1,80756	832,881	832,881	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	13	1,78172	3,51032	832,881	832,881	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	19	1,04368	4,1688	944,3222	944,3222	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	25	1,39188	3,36428	983,7066	983,7066	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	31	14,71608	3,18636	1131,8874	1131,8874	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	37	43,75916	43,32536	384,6042	384,6042	22,5	278,4	500	500	440	6D25	6D25	2500	2500
1	2	54,55672	15,06744	343,8198	343,8198	22,5	278,4	400	400	340	4D25	4D25	1600	1600
	8	6,2364	2,85628	618,4314	618,4314	22,5	278,4	400	400	340	4D25	4D25	1600	1600
	14	0,38392	4,5028	618,4314	618,4314	22,5	278,4	400	400	340	4D25	4D25	1600	1600
	20	0,3474	3,61812	730,1918	730,1918	22,5	278,4	400	400	340	4D25	4D25	1600	1600
	26	0,64744	2,45328	770,2146	770,2146	22,5	278,4	400	400	340	4D25	4D25	1600	1600
	32	12,17752	2,93468	925,1154	925,1154	22,5	278,4	400	400	340	4D25	4D25	1600	1600
2	3	50,70776	12,81188	227,3682	227,3682	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	9	6,90824	1,9056	410,4426	410,4426	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	15	0,56252	3,31296	410,4426	410,4426	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	21	1,36272	3,57908	522,5222	522,5222	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	27	1,47612	2,32624	562,8642	562,8642	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	33	10,62908	3,00124	717,765	717,765	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	39	35,06988	41,05052	245,5554	245,5554	22,5	278,4	350	350	290	4D20	4D20	1225	1225
3	4	45,77772	15,79	113,0796	113,0796	22,5	278,4	300	300	240	5D16	5D16	900	900
	10	9,60452	6,87716	204,6168	204,6168	22,5	278,4	300	300	240	5D16	5D16	900	900
	16	0,8664	8,8826	204,6168	204,6168	22,5	278,4	300	300	240	5D16	5D16	900	900
	22	1,9616	7,84816	316,6964	316,6964	22,5	278,4	300	300	240	5D16	5D16	900	900
	28	1,82408	4,15412	357,3576	357,3576	22,5	278,4	300	300	240	5D16	5D16	900	900
	34	8,54268	7,36536	512,2584	512,2584	22,5	278,4	300	300	240	5D16	5D16	900	900
	40	26,58488	34,3352	181,584	181,584	22,5	278,4	300	300	240	5D16	5D16	900	900
4	23	40,352	8,93096	113,0796	113,0796	22,5	278,4	300	200	240	5D16	5D16	900	900
	29	3,2316	17,30384	143,7408	143,7408	22,5	278,4	300	300	240	5D16	5D16	900	900
	35	4,49144	7,34592	307,6416	307,6416	22,5	278,4	300	300	240	5D16	5D16	900	900
	41	25,84508	35,3002	118,8216	118,8216	22,5	278,4	300	300	240	5D16	5D16	900	900
5	30	35,21664	35,87636	56,0592	56,0592	22,5	278,4	300	300	240	5D16	5D16	900	900
	36	3,80524	19,61384	103,0248	103,0248	22,5	278,4	300	300	240	5D16	5D16	900	900
	42	33,83964	62,19532	56,0592	56,0592	22,5	278,4	300	300	240	5D16	5D16	900	900

(Sumber : Hasil Perhitungan)

Tabel VII.6 Perbandingan luas tulangan lentur balok terpasang di lapangan dan hasil hitungan pada portal as-2

Lantai	No. balok	Posisi balok	Luas tulangan (mm ²)				Nilai banding				
			Di lapangan		Hasil hitungan		Atas		Bawah		
			Atas	Bawah	Atas	Bawah	Ujung	Lapangan	Ujung	Lapangan	
B M	43	Ki	1005	603	1256	942	1,249751		1,5621891		
		Lap	603	1005	942	1256		1,562189		1,2497512	
		Ka	1005	603	1884	942	1,874627		1,5621891		
	49	Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
	55	Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
	61	Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
	67	Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
	73	Ki	1005	603	1256	942	1,249751		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	942	942	0,937313		1,5621891		
	1	44	Ki	1005	603	1256	942	1,249751		1,5621891	
			Lap	603	1005	942	1256		1,562189		1,2497512
			Ka	1005	603	1884	942	1,874627		1,5621891	
		50	Ki	1005	603	1570	942	1,562189		1,5621891	
			Lap	603	1005	942	942		1,562189		0,9373134
			Ka	1005	603	1570	942	1,562189		1,5621891	
56		Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
62		Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	942	942	0,937313		1,5621891		
68		Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
74		Ki	1005	603	1256	942	1,249751		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	942	942	0,937313		1,5621891		
2		45	Ki	1005	603	942	942	0,937313		1,5621891	
			Lap	603	1005	942	1256		1,562189		1,2497512
			Ka	1005	603	1884	942	1,874627		1,5621891	
		51	Ki	1005	603	1570	942	1,562189		1,5621891	
			Lap	603	1005	942	942		1,562189		0,9373134
			Ka	1005	603	1570	942	1,562189		1,5621891	
	57	Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
	63	Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
	69	Ki	1005	603	1570	942	1,562189		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	1570	942	1,562189		1,5621891		
	75	Ki	1005	603	1256	942	1,249751		1,5621891		
		Lap	603	1005	942	942		1,562189		0,9373134	
		Ka	1005	603	942	942	0,937313		1,5621891		

(Sumber : Hasil Perhitungan)

Tabel VII.6 Perbandingan luas tulangan lentur balok terpasang di lapangan dan hasil hitungan pada portal as-2(lanjutan)

Lantai	No. balok	Posisi balok	Luas tulangan (mm ²)				Nilai banding			
			Di lapangan		Hasil hitungan		Atas		Bawah	
			Atas	Bawah	Atas	Bawah	Ujung	Lapangan	Ujung	Lapangan
3	46	Ki	1005	603	942	942	0,937313		1,5621891	
		Lap	603	1005	942	1570		1,562189		1,5621891
		Ka	1005	603	1884	942	1,874627		1,5621891	
	52	Ki	1005	603	1884	942	1,874627		1,5621891	
		Lap	603	1005	942	942		1,562189		0,9373134
		Ka	1005	603	1570	942	1,562189		1,5621891	
	58	Ki	1005	603	1570	942	1,562189		1,5621891	
		Lap	603	1005	942	942		1,562189		0,9373134
		Ka	1005	603	1570	942	1,562189		1,5621891	
	64	Ki	1005	603	1884	942	1,874627		1,5621891	
		Lap	603	1005	942	942		1,562189		0,9373134
		Ka	1005	603	1570	942	1,562189		1,5621891	
	70	Ki	1005	603	1570	942	1,562189		1,5621891	
		Lap	603	1005	942	942		1,562189		0,9373134
		Ka	1005	603	1570	942	1,562189		1,5621891	
	76	Ki	1005	603	1256	942	1,249751		1,5621891	
		Lap	603	1005	942	942		1,562189		0,9373134
		Ka	1005	603	942	942	0,937313		1,5621891	
4	65	Ki	1005	603	942	942	0,937313		1,5621891	
		Lap	603	1005	942	1256		1,562189		1,2497512
		Ka	1005	603	1884	942	1,874627		1,5621891	
	71	Ki	1005	603	1884	942	1,874627		1,5621891	
		Lap	603	1005	942	942		1,562189		0,9373134
		Ka	1005	603	1256	942	1,249751		1,5621891	
	77	Ki	1005	603	1256	942	1,249751		1,5621891	
		Lap	603	1005	942	942		1,562189		0,9373134
		Ka	1005	603	942	942	0,937313		1,5621891	
5	72	Ki	804	402	628	628	0,781095		1,5621891	
		Lap	402	804	628	942		1,562189		1,1716418
		Ka	804	402	1256	628	1,562189		1,5621891	
	78	Ki	804	402	1256	628	1,562189		1,5621891	
		Lap	402	804	628	942		1,562189		1,1716418
		Ka	804	402	628	628	0,781095		1,5621891	
							$\Sigma n = 83.420$	$\Sigma n = 45.303$	$\Sigma n = 90.606$	$\Sigma n = 29.52$

(Sumber : Hasil Perhitungan)

4D20	3D20
3D20	4D20
6D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
4D20	3D20
3D20	3D20
3D20	3D20
4D20	3D20
3D20	4D20
6D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
3D20	3D20
3D20	3D20
3D20	3D20
3D20	4D20
6D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
4D20	3D20
3D20	3D20
3D20	3D20
3D20	4D20
6D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
4D20	3D20
3D20	3D20
3D20	3D20

3D20	3D20
3D20	5D20
6D20	3D20
6D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
6D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
4D20	3D20
3D20	3D20
3D20	3D20
3D20	3D20
3D20	4D20
6D20	3D20
6D20	3D20
3D20	3D20
4D20	3D20
4D20	3D20
3D20	3D20
3D20	3D20
2D20	2D20
2D20	3D20
4D20	2D20
4D20	2D20
2D20	3D20
2D20	2D20

Tabel VII.10 Luas tulangan geser balok terpasang di lapangan dan hasil hitungan portal as-2

Lantai	No. balok	Posisi balok	Luas tulangan begel (mm ²)				Niali banding		
			Terpasang di lapangan		Hasil hitungan		Dalam sendi plastis	Diluar sendi plastis	
			Dalam sendi plastis	Diluar sendi plastis	Dalam sendi plastis	Diluar sendi plastis			
B M	43	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	49	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	55	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	61	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	67	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	73	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	1	44	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
			Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
50		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
56		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
62		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
68		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
74		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
2		45	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
			Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
	51	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	57	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	63	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	69	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	75	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
	3	46	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
			Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
52		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
58		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
64		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
70		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
76		Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674	

(Sumber : Hasil Perhitungan)

Tabel VII.10 Luas tulangan geser balok terpasang di lapangan dan hasil hitungan portal as-2 (lanjutan)

Lantai	No. balok	Posisi balok	Luas tulangan begel (mm ²)				Niali banding	
			Terpasang di lapangan		Hasil hitungan		Dalam sendi plastis	Diluar sendi plastis
			Dalam sendi plastis	Diluar sendi plastis	Dalam sendi plastis	Diluar sendi plastis		
4	65	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
	71	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
	77	Ki	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
		Ka	1435,429	502,4	1004,8	490,1463	0,699999791	0,975609674
5	72	Ki	669,8667	502,4	1256	628	1,874999907	1,25
		Ka	669,8667	502,4	1256	628	1,874999907	1,25
	78	Ki	669,8667	502,4	1256	628	1,874999907	1,25
		Ka	669,8667	502,4	1256	628	1,874999907	1,25
Jumlah							$\Sigma n = 45.29998$	$\Sigma n = 57.68292$

(Sumber : Hasil Perhitungan)

Tabel VII.20 Luas tulangan geser kolom terpasang di lapangan dan hasil hitungan portal as-2

Lantai	No kolom	Luas tulangan geser kolom (mm ²)				Nilai banding	
		Terpasang di lapangan		Hasil hitungan		Dalam sendi plastis	Luar sendi plastis
		Dalam sendi plastis	Luar sendi plastis	Dalam sendi plastis	Luar sendi plastis		
B M	1	669,86667	669,86667	608,9697	608,9697	0,909090909	0,909090909
	7	669,86667	669,86667	608,9697	608,9697	0,909090909	0,909090909
	13	669,86667	669,86667	608,9697	608,9697	0,909090909	0,909090909
	19	669,86667	669,86667	608,9697	608,9697	0,909090909	0,909090909
	25	669,86667	669,86667	608,9697	608,9697	0,909090909	0,909090909
	31	669,86667	669,86667	608,9697	608,9697	0,909090909	0,909090909
	37	669,86667	669,86667	608,9697	608,9697	0,909090909	0,909090909
1	2	669,86667	669,86667	591,05882	591,05882	0,882352932	0,882352932
	8	669,86667	669,86667	591,05882	591,05882	0,882352932	0,882352932
	14	669,86667	669,86667	591,05882	591,05882	0,882352932	0,882352932
	20	669,86667	669,86667	591,05882	591,05882	0,882352932	0,882352932
	26	669,86667	669,86667	591,05882	591,05882	0,882352932	0,882352932
	32	669,86667	669,86667	591,05882	591,05882	0,882352932	0,882352932
	38	669,86667	669,86667	591,05882	591,05882	0,882352932	0,882352932
2	3	669,86667	669,86667	692,96552	692,96552	1,034482758	1,034482758
	9	669,86667	669,86667	692,96552	692,96552	1,034482758	1,034482758
	15	669,86667	669,86667	692,96552	692,96552	1,034482758	1,034482758
	21	669,86667	669,86667	692,96552	692,96552	1,034482758	1,034482758
	27	669,86667	669,86667	692,96552	692,96552	1,034482758	1,034482758
	33	669,86667	669,86667	692,96552	692,96552	1,034482758	1,034482758
	39	669,86667	669,86667	692,96552	692,96552	1,034482758	1,034482758
3	4	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	10	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	16	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	22	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	28	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	34	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	40	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
4	23	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	29	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	35	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	41	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
5	30	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	36	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
	42	669,86667	669,86667	837,33333	837,33333	1,249999989	1,249999989
						Σn = 37.2814860	Σn = 37.2814860

(Sumber : Hasil Perhitungan)
37,28148603

Tabel VII.15 Susunan tulangan memanjang kolom terpasang di lapangan dan hasil hitungan portal

Lantai	No kolom	Susunan tulangan	
		Terpasang di lapangan	Hasil hitungan
B M	1	8D25	12D25
	7	8D25	12D25
	13	8D25	12D25
	19	8D25	12D25
	25	8D25	12D25
	31	8D25	12D25
	37	8D25	12D25
1	2	8D25	8D25
	8	8D25	8D25
	14	8D25	8D25
	20	8D25	8D25
	26	8D25	8D25
	32	8D25	8D25
	38	8D25	8D25
2	3	8D20	8D20
	9	8D20	8D20
	15	8D20	8D20
	21	8D20	8D20
	27	8D20	8D20
	33	8D20	8D20
	39	8D20	8D20
3	4	8D16	10D16
	10	8D16	10D16
	16	8D16	10D16
	22	8D16	10D16
	28	8D16	10D16
	34	8D16	10D16
4	23	8D16	10D16
	29	8D16	10D16
	35	8D16	10D16
	41	8D16	10D16
5	30	8D16	10D16
	36	8D16	10D16
	42	8D16	10D16

(Sumber : Hasil Hitungan)

las-2

Tabel V.9 Tulangan geser balok pada portal as-2

Lantai	No. balok	Posisi balok	Geser perlu (KN)		$V_{u,d}$	Tulangan begel				
			$V_{u,2}$	$V_{u,1}$		Sepanjang d		Diluar d		
						Perlu (mm^2)	Terpasang	Perlu (mm^2)	Terpasang	
B M	43	Ki	110,0072	0	85,36559	714,07048	2dp8-100	419,0613	2dp8-205	
		Ka	120,4264	8,6272	95,71878	890,53403	2dp8-100	419,0613	2dp8-205	
	49	Ki	111,8264	0,026	86,96944	751,61656	2dp8-100	419,0613	2dp8-205	
		Ka	111,7732	0	86,92229	750,93962	2dp8-100	419,0613	2dp8-205	
	55	Ki	111,6504	0	86,82679	749,56863	2dp8-100	419,0613	2dp8-205	
		Ka	111,9492	0,1488	87,09224	753,37952	2dp8-100	419,0613	2dp8-205	
	61	Ki	111,8636	0,062622	87,00652	752,14877	2dp8-100	419,0613	2dp8-205	
		Ka	111,736	0	86,89336	750,52431	2dp8-100	419,0613	2dp8-205	
	67	Ki	112,698	0,8976	87,84104	764,12954	2dp8-100	419,0613	2dp8-205	
		Ka	110,9028	0	86,24541	741,22209	2dp8-100	419,0613	2dp8-205	
	73	Ki	90,1708	0	70,03265	501,28489	2dp8-100	419,0613	2dp8-205	
		Ka	69,3308	0,2624	53,44507	419,0613	2dp8-100	419,0613	2dp8-205	
	1	44	Ki	107,1504	0	83,22014	689,25653	2dp8-100	419,0613	2dp8-205
			Ka	123,2844	11,484	98,57651	931,95797	2dp8-100	435,01239	2dp8-205
50		Ki	112,1652	0,366	87,30851	756,48431	2dp8-100	419,0613	2dp8-205	
		Ka	111,4344	0	86,65882	747,15711	2dp8-100	419,0613	2dp8-205	
56		Ki	111,6948	0	86,86132	750,06433	2dp8-100	419,0613	2dp8-205	
		Ka	111,9048	0,1044	87,04784	752,81929	2dp8-100	419,0613	2dp8-205	
62		Ki	112,1888	0,3884	87,33184	756,81929	2dp8-100	419,0613	2dp8-205	
		Ka	111,412	0	85,78742	670,26587	2dp8-100	419,0613	2dp8-220	
68		Ki	112,99	1,1904	88,13322	768,32414	2dp8-100	419,0613	2dp8-205	
		Ka	110,61	0	85,1697	661,86369	2dp8-100	419,0613	2dp8-205	
74		Ki	91,4548	1,0204	71,25778	518,74762	2dp8-100	419,0613	2dp8-205	
		Ka	68,048	0	52,39696	419,061303	2dp8-100	419,0613	2dp8-205	
2		45	Ki	104,7892	0	80,68768	600,88189	2dp8-100	419,0613	2dp8-205
			Ka	125,6444	7,0112	99,42646	944,27833	2dp8-100	447,33276	2dp8-205
	51	Ki	112,2488	0,4484	87,39184	757,68067	2dp8-100	419,0613	2dp8-205	
		Ka	111,3508	0	85,59381	746,22376	2dp8-100	419,0613	2dp8-205	
	57	Ki	111,6212	0	86,80409	749,24263	2dp8-100	419,0613	2dp8-205	
		Ka	111,9784	0,178	87,12144	753,79872	2dp8-100	419,0613	2dp8-205	
	63	Ki	112,45	0,6496	87,59304	760,56917	2dp8-100	419,0613	2dp8-205	
		Ka	111,1496	0	86,43734	743,97748	2dp8-100	419,0613	2dp8-205	
	69	Ki	113,3028	1,5024	88,44584	772,81225	2dp8-100	419,0613	2dp8-205	
		Ka	110,2968	0	84,92854	658,58244	2dp8-100	419,0613	2dp8-205	
	75	Ki	92,8784	2,444	72,68138	539,03931	2dp8-100	419,0613	2dp8-205	
		Ka	66,6232	0	51,29986	419,061303	2dp8-100	419,0613	2dp8-205	
	3	46	Ki	96,512	0	74,31424	514,16554	2dp8-100	419,0613	2dp8-205
			Ka	133,9228	22,1224	109,2149	1086,1656	2dp8-100	589,22	2dp8-205
52		Ki	114,388	2,5876	89,68011	803,00131	2dp8-100	419,0613	2dp8-205	
		Ka	109,2128	0	84,93115	722,35419	2dp8-100	419,0613	2dp8-205	
58		Ki	112,9248	1,1256	88,06811	767,38938	2dp8-100	419,0613	2dp8-205	
		Ka	110,6748	0	85,2196	662,54257	2dp8-100	419,0613	2dp8-205	
64		Ki	114,8476	3,0484	89,99091	794,99374	2dp8-100	419,0613	2dp8-205	
		Ka	108,752	0	83,73904	642,3983	2dp8-100	419,0613	2dp8-205	
70		Ki	113,2708	1,4704	88,41384	772,35284	2dp8-100	419,0613	2dp8-205	
		Ka	110,3288	0	84,95318	658,91769	2dp8-100	419,0613	2dp8-205	
76		Ki	94,7012	4,2668	74,50418	565,02111	2dp8-100	419,0613	2dp8-205	
		Ka	64,8004	0	49,89631	419,061303	2dp8-100	419,0613	2dp8-205	

(Sumber : Hasil Perhitungan)

Tabel V.9 Tulangan geser balok pada portal as-2 (lanjutan)

Lantai	No. balok	Posisi balok	Geser perlu (KN)		$V_{u,d}$	Tulangan begel			
			$V_{u,2}$	$V_{u,1}$		Sepanjang d		Diluar d	
						Perlu (mm^2)	Terpasang	Perlu (mm^2)	Terpasang
4	65	Ki	93,3776	0	71,90075	481,32789	2dp8-100	419,0613	2dp8-205
		Ka	130,2232	18,4228	105,5153	1032,5385	2dp8-100	535,5929	2dp8-205
	71	Ki	121,5772	9,778	95,86338	807,36074	2dp8-100	419,0613	2dp8-205
		Ka	102,0224	0	79,2374	632,48732	2dp8-100	419,0613	2dp8-205
	77	Ki	94,0748	3,6416	73,87805	556,09636	2dp8-100	419,0613	2dp8-205
		Ka	65,4268	0	50,37864	419,061303	2dp8-100	419,0613	2dp8-205
5	72	Ki	52,2908	0	42,0069	359,195402	2dp8-80	359,195402	2dp8-160
		Ka	68,0464	7,8772	56,69448	648,11815	2dp8-80	359,195402	2dp8-160
	78	Ki	68,8684	8,6992	57,43625	648,56945	2dp8-80	359,195402	2dp8-160
		Ka	51,4688	0	41,3466	359,195402	2dp8-80	359,195402	2dp8-160

(Sumber : Hasil Perhitungan)

Tabel V. 13 Penulangan geser kolom portal as-2

Lantai	No kolom	Vu,k (kN)	Pu,k (KN)	Sepanjang l_0		Diluar l_0	
				Perlu (mm ²)	Terpasang	Perlu (mm ²)	Terpasang
B M	1	19,129	467,0514	598,659	2dp8-165	598,659	2dp8-165
	7	2,79	832,881	598,659	2dp8-165	598,659	2dp8-165
	13	0,386	832,881	598,659	2dp8-165	598,659	2dp8-165
	19	0,128	944,3222	598,659	2dp8-165	598,659	2dp8-165
	25	0,246	983,7066	598,659	2dp8-165	598,659	2dp8-165
	31	3,388	1131,8874	598,659	2dp8-165	598,659	2dp8-165
	37	12,683	384,6042	598,659	2dp8-165	598,659	2dp8-165
1	2	13,945	343,8198	478,9272	2dp8-170	478,9272	2dp8-170
	8	1,729	618,4314	478,9272	2dp8-170	478,9272	2dp8-170
	14	0,024	618,4314	478,9272	2dp8-170	478,9272	2dp8-170
	20	0,018	730,1918	478,9272	2dp8-170	478,9272	2dp8-170
	26	0,077	770,2146	478,9272	2dp8-170	478,9272	2dp8-170
	32	2,71	925,1154	478,9272	2dp8-170	478,9272	2dp8-170
	38	9,576	311,6898	478,9272	2dp8-170	478,9272	2dp8-170
2	3	15,085	227,3682	419,0613	2dp8-145	419,0613	2dp8-145
	9	2,259	410,4426	419,0613	2dp8-145	419,0613	2dp8-145
	15	0,115	410,4426	419,0613	2dp8-145	419,0613	2dp8-145
	21	-0,356	522,5222	419,0613	2dp8-145	419,0613	2dp8-145
	27	-0,396	562,8642	419,0613	2dp8-145	419,0613	2dp8-145
	33	2,653	717,765	419,0613	2dp8-145	419,0613	2dp8-145
	39	10,81	245,5554	419,0613	2dp8-145	419,0613	2dp8-145
3	4	13,046	113,0796	359,1954	2dp8-120	359,1954	2dp8-120
	10	2,76	204,6168	359,1954	2dp8-120	359,1954	2dp8-120
	16	0,164	204,6168	359,1954	2dp8-120	359,1954	2dp8-120
	22	0,379	316,6964	359,1954	2dp8-120	359,1954	2dp8-120
	28	0,446	357,3576	359,1954	2dp8-120	359,1954	2dp8-120
	34	2,191	512,2584	359,1954	2dp8-120	359,1954	2dp8-120
	40	8,326	181,584	359,1954	2dp8-120	359,1954	2dp8-120
4	23	9,425	113,0796	359,1954	2dp8-120	359,1954	2dp8-120
	29	0,137	143,7408	359,1954	2dp8-120	359,1954	2dp8-120
	35	2,191	307,6416	359,1954	2dp8-120	359,1954	2dp8-120
	41	8,343	118,8216	359,1954	2dp8-120	359,1954	2dp8-120
5	30	8,306	56,0592	359,1954	2dp8-120	359,1954	2dp8-120
	36	1,308	103,0248	359,1954	2dp8-120	359,1954	2dp8-120
	42	9,614	56,0592	359,1954	2dp8-120	359,1954	2dp8-120

(Sumber : Hasil Perhitungan)

Tabel V.5 Penulangan lentur balok dan momen tersedia balok portal as-2

Lantai	No. balok	Posisi balok	Momen perlu (KNm)		Susunan tulangan		Momen tersedia (KNm)		
			Negatif	Positif	Atas	Bawah	Negatif	positif	
B M	43	Ki	115,273	57,6365	4D20	3D20	115,74394	115,74394	
		Lap	0	89,78132	3D20	4D20	115,74394	115,74394	
		Ka	146,531	73,2655	6D20	3D20	160,67777	160,67777	
	49	Ki	133,84	66,92	5D20	3D20	142,48542	142,48542	
		Lap	0	76,6694	3D20	3D20	88,89628	88,89628	
		Ka	133,685	66,8425	5D20	3D20	142,48542	142,48542	
	55	Ki	132,716	66,358	5D20	3D20	142,48542	142,48542	
		Lap	0	77,26824	3D20	3D20	88,89628	88,89628	
		Ka	133,612	66,806	5D20	3D20	142,48542	142,48542	
	61	Ki	133,405	66,7025	5D20	3D20	142,48542	142,48542	
		Lap		77,21672	3D20	3D20	88,89628	88,89628	
		Ka	133,026	66,513	5D20	3D20	142,48542	142,48542	
	67	Ki	134,296	67,148	5D20	3D20	142,48542	142,48542	
		Lap		78,82816	3D20	3D20	88,89628	88,89628	
		Ka	128,912	64,456	5D20	3D20	142,48542	142,48542	
	73	Ki	103,594	51,797	4D20	3D20	115,74394	115,74394	
		Lap		52,53468	3D20	3D20	88,89628	88,89628	
		Ka	73,1213	36,56065	3D20	3D20	88,89628	88,89628	
	1	44	Ki	100,106	50,053	4D20	3D20	115,74394	115,74394
			Lap		96,37624	3D20	4D20	115,74394	115,74394
			Ka	148,508	74,254	6D20	3D20	160,67777	160,67777
50		Ki	135,831	67,9155	5D20	3D20	142,48542	142,48542	
		Lap		75,69868	3D20	3D20	88,89628	88,89628	
		Ka	133,635	66,8175	5D20	3D20	142,48542	142,48542	
56		Ki	132,999	66,4995	5D20	3D20	142,48542	142,48542	
		Lap		77,11788	3D20	3D20	88,89628	88,89628	
		Ka	133,63	66,815	5D20	3D20	142,48542	142,48542	
62		Ki	134,494	67,247	5D20	3D20	142,48542	142,48542	
		Lap		77,10548	3D20	3D20	88,89628	88,89628	
		Ka	60,4158	30,2079	3D20	3D20	88,89628	88,89628	
68		Ki	133,841	66,9205	5D20	3D20	142,48542	142,48542	
		Lap		80,16412	3D20	3D20	88,89628	88,89628	
		Ka	126,659	63,3295	5D20	3D20	142,48542	142,48542	
74		Ki	104,757	52,3785	4D20	3D20	115,74394	115,74394	
		Lap	0	55,32296	3D20	3D20	88,89628	88,89628	
		Ka	66,5815	33,29075	3D20	3D20	88,89628	88,89628	
2		45	Ki	88,1032	44,0516	3D20	3D20	88,89628	88,89628
			Lap	0	101,2971	3D20	4D20	115,74394	115,74394
			Ka	150,669	75,3345	6D20	3D20	160,67777	160,67777
	51	Ki	136,568	68,284	5D20	3D20	142,48542	142,48542	
		Lap		75,21068	3D20	3D20	88,89628	88,89628	
		Ka	133,874	66,937	5D20	3D20	142,48542	142,48542	
	57	Ki	133,334	66,667	5D20	3D20	142,48542	142,48542	
		Lap		76,56288	3D20	3D20	88,89628	88,89628	
		Ka	134,404	67,202	5D20	3D20	142,48542	142,48542	
	63	Ki	135,031	67,5155	5D20	3D20	142,48542	142,48542	
		Lap		77,3532	3D20	3D20	88,89628	88,89628	
		Ka	131,127	65,5635	5D20	3D20	142,48542	142,48542	
	69	Ki	133,628	66,814	5D20	3D20	142,48542	142,48542	
		Lap	0	81,3108	3D20	3D20	88,89628	88,89628	
		Ka	124,614	62,307	5D20	3D20	142,48542	142,48542	
	75	Ki	106,162	53,081	4D20	3D20	115,74394	115,74394	
		Lap	0	58,1888	3D20	3D20	88,89628	88,89628	
		Ka	59,4453	29,72265	3D20	3D20	88,89628	88,89628	

(Sumber : Hasil Hitungan)

Tabel V.5 Penulangan lentur balok dan momen tersedia balok portal as-2 (lanjutan)

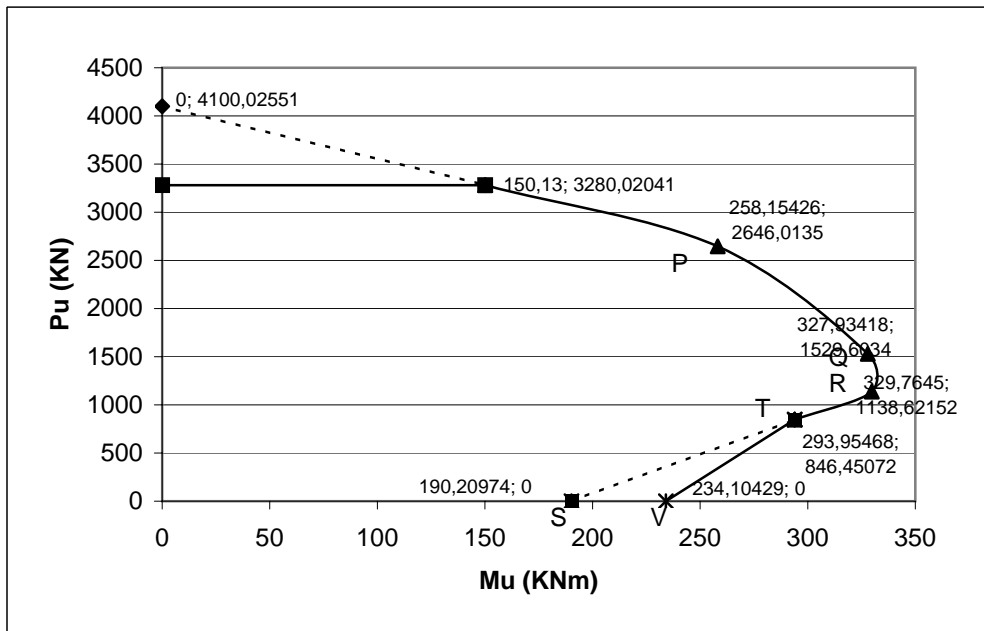
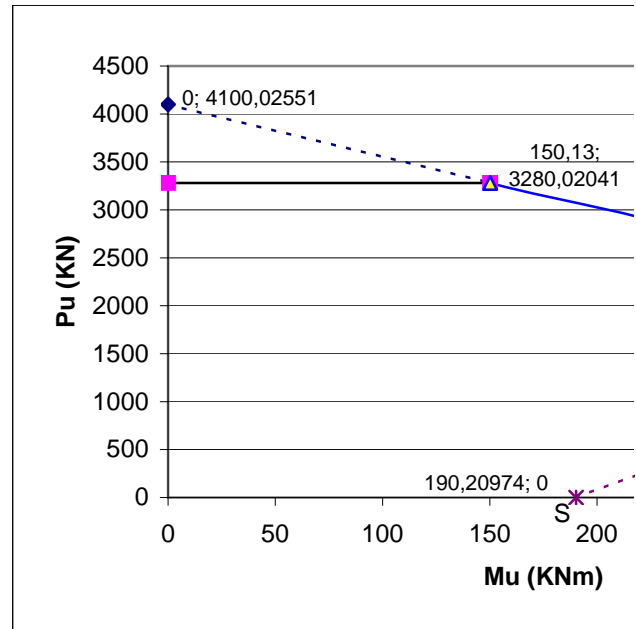
Lantai	No. balok	Posisi balok	Momen perlu (KNm)		Susunan tulangan		Momen tersedia (KNm)		
			Negatif	Positif	Atas	Bawah	Negatif	positif	
3	46	Ki	45,7777	22,88885	3D20	3D20	88,89628	88,89628	
		Lap	0	118,7877	3D20	5D20	142,48542	142,48542	
		Ka	158,013	79,0065	6D20	3D20	160,67777	160,67777	
	52	Ki	148,409	74,2045	6D20	3D20	160,67777	160,67777	
		Lap	0	69,78796	3D20	3D20	88,89628	88,89628	
		Ka	132,879	66,4395	5D20	3D20	142,48542	142,48542	
	58	Ki	133,746	66,873	5D20	3D20	142,48542	142,48542	
		Lap		80,06356	3D20	3D20	88,89628	88,89628	
		Ka	126,991	63,4955	5D20	3D20	142,48542	142,48542	
	64	Ki	145,503	72,7515	6D20	3D20	160,67777	160,67777	
		Lap		74,0724	3D20	3D20	88,89628	88,89628	
		Ka	127,216	63,608	5D20	3D20	142,48542	142,48542	
	70	Ki	131,073	65,5365	5D20	3D20	142,48542	142,48542	
		Lap		83,7708	3D20	3D20	88,89628	88,89628	
		Ka	122,249	61,1245	5D20	3D20	142,48542	142,48542	
	76	Ki	109,215	54,6075	4D20	3D20	115,74394	115,74394	
		Lap	0	60,60344	3D20	3D20	88,89628	88,89628	
		Ka	51,5632	25,7816	3D20	3D20	88,89628	88,89628	
	4	65	Ki	40,352	20,176	3D20	3D20	88,89628	88,89628
			Lap	14,9922	114,8138	3D20	4D20	115,74394	115,74394
			Ka	150,884	75,442	6D20	3D20	160,67777	160,67777
71		Ki	160,3817	80,19085	6D20	3D20	160,67777	160,67777	
		Lap	0	74,94908	3D20	3D20	88,89628	88,89628	
		Ka	106,149	53,0745	4D20	3D20	115,74394	115,74394	
77		Ki	105,642	52,821	4D20	3D20	115,74394	115,74394	
		Lap	0	62,29916	3D20	3D20	88,89628	88,89628	
		Ka	51,7442	25,8721	3D20	3D20	88,89628	88,89628	
5	72	Ki	35,2166	17,6083	2D20	2D20	46,75323	46,75323	
		Lap	0	52,76752	2D20	3D20	66,71594	66,71594	
		Ka	82,4871	41,24355	4D20	2D20	86,542875	86,542875	
	78	Ki	86,0395	43,01975	4D20	2D20	86,542875	86,542875	
		Lap	0	51,67976	2D20	3D20	66,71594	66,71594	
		Ka	33,8396	16,9198	2D20	2D20	46,75323	46,75323	

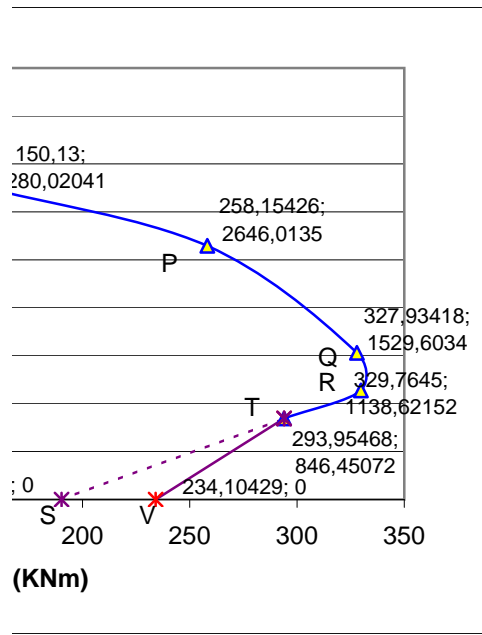
(Sumber : Hasil Hitungan)

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Mu	Pu	Mu	Pu
0	4100,0255	0	4100,026
0	3280,0204	150,13	3280,02
150,13	3280,0204		
258,1543	2646,0135	0	3280,02
327,9342	1529,6034	150,13	3280,02
329,7645	1138,6215		
293,9547	846,45072		
190,2097	0		
234,1043	0	234,10429	0
		293,95468	846,4507
		190,20974	0
		293,95468	846,4507





Tabel Momen perlu balok akibat beban kombinasi pada portal as-E

Lantai	No balok	Posisi balok	Momen (KNm)				Momen perlu (KNm)					
			Mati	Hidup	E. kiri	E. kanan	1,2D+1,6L	1,05(D+LR+ ϕ d.e)		0,9(D+E)		
								Ki	Ka	Ki	Ka	
B M	25	Ki	-58,9747	-23,8111	0	0	-108,8674	-81,925	-81,9248	-53,0772	-53,07723	
		Lap	47,8242	18,3191	0	0	86,6996	65,6035	65,6035	43,0418	43,04178	
		Ka	-73,156	-29,5507	0	0	-135,0683	-101,64	-101,636	-65,8404	-65,8404	
	31	Ki	-70,2624	-28,3629	0	0	-129,6955	-97,6	-97,6004	-63,2362	-63,23616	
		Lap	43,9282	16,7467	0	0	79,50856	60,1918	60,1918	39,5354	39,53538	
		Ka	-69,6603	-28,1438	0	0	-128,6224	-96,784	-96,7841	-62,6943	-62,69427	
	37	Ki	-72,8871	-29,4511	0	0	-134,5863	-101,27	-101,27	-65,5984	-65,59839	
		Lap	47,8471	18,3285	0	0	86,74212	65,6354	65,6354	43,0624	43,06239	
		Ka	-59,1978	-23,8919	0	0	-109,2644	-82,227	-82,2269	-53,278	-53,27802	
1	26	Ki	-52,0223	-20,9737	0	0	-95,98468	-72,241	-72,2413	-46,8201	-46,82007	
		Lap	50,9741	19,6095	0	0	92,54412	69,9948	69,9948	45,8767	45,87669	
		Ka	-73,8087	-29,8074	0	0	-136,2623	-102,54	-102,537	-66,4278	-66,42783	
	32	Ki	-71,2234	-28,759	0	0	-131,4825	-98,942	-98,9421	-64,1011	-64,10106	
		Lap	43,4972	16,5599	0	0	78,69248	59,5824	59,5824	39,1475	39,14748	
		Ka	-69,5615	-28,1211	0	0	-128,4676	-96,661	-96,6613	-62,6054	-62,60535	
	38	Ki	-72,8903	-29,474	0	0	-134,6268	-101,29	-101,293	-65,6013	-65,60127	
		Lap	51,106	19,6469	0	0	92,76224	70,1647	70,1647	45,9954	45,9954	
		Ka	-52,6769	-21,2322	0	0	-97,1838	-73,146	-73,1458	-47,4092	-47,40921	
2	27	Ki	-46,0751	-18,792	0	0	-85,35732	-64,164	-64,1641	-41,4676	-41,46759	
		Lap	53,6218	20,539	0	0	97,20856	73,5557	73,5557	48,2596	48,25962	
		Ka	-74,4605	-30,13	0	0	-137,5606	-103,49	-103,493	-67,0145	-67,01445	
	33	Ki	-71,86	-28,796	0	0	-132,3056	-99,642	-99,6416	-64,674	-64,674	
		Lap	43,1472	16,4845	0	0	78,15184	59,1515	59,1515	38,8325	38,83248	
		Ka	-69,6248	-28,235	0	0	-128,7258	-96,823	-96,8234	-62,6623	-62,66232	
	39	Ki	-72,6527	-29,4085	0	0	-134,2368	-100,99	-100,988	-65,3874	-65,38743	
		Lap	54,188	20,8535	0	0	98,3912	74,4143	74,4143	48,7692	48,7692	
		Ka	-46,7504	-18,8845	0	0	-86,31568	-64,951	-64,9509	-42,0754	-42,07536	
3	28	Ki	-22,2873	-9,9416	0	0	-42,65132	-31,753	-31,7526	-20,0586	-20,05857	
		Lap	50,8045	24,4294	0	0	100,0524	73,8654	73,8654	45,7241	45,72405	
		Ka	-69,7116	-31,1996	0	0	-133,5733	-99,405	-99,4048	-62,7404	-62,74044	
	34	Ki	-75,7052	-32,4266	0	0	-142,7288	-106,73	-106,729	-68,1347	-68,13468	
		Lap	42,7526	15,598	0	0	76,25992	57,9926	57,9926	38,4773	38,47734	
		Ka	-66,5688	-26,3775	0	0	-122,0866	-92,054	-92,0543	-59,9119	-59,91192	
	40	Ki	-75,4927	-30,1839	0	0	-138,8855	-104,62	-104,622	-67,9434	-67,94343	
		Lap	57,5313	22,3742	0	0	104,8363	79,2022	79,2022	51,7782	51,77817	
		Ka	-37,2239	-15,0678	0	0	-68,77716	-51,742	-51,742	-33,5015	-33,50151	
4	44	Ki	-45,279	-16,875	0	0	-81,3348	-61,718	-61,718	-40,7511	-40,7511	
		Lap	-8,7435	-2,8125	0	0	-14,9922	-11,543	-11,5432	-7,86915	-7,86915	
		Ka	0	0	0	0	0	0	0	0	0	
	35	Ki	-68,1394	-26,4233	0	0	-124,0446	-93,742	-93,7419	-61,3255	-61,32546	
		Lap	46,3888	18,0915	0	0	84,61296	63,9051	63,9051	41,7499	41,74992	
		Ka	-66,8622	-27,3936	0	0	-124,0644	-93,216	-93,2159	-60,176	-60,17598	
	41	Ki	-77,5334	-31,61	0	0	-143,6161	-107,96	-107,962	-69,7801	-69,78006	
		Lap	57,3123	22,0419	0	0	104,0418	78,6931	78,6931	51,5811	51,58107	
		Ka	-35,6211	-14,3062	0	0	-65,63524	-49,419	-49,4194	-32,059	-32,05899	
5	36	Ki	-19,3955	-7,8761	0	0	-35,87636	-26,981	-26,9812	-17,456	-17,45595	
		Lap	27,1779	10,7592	0	0	49,8282	37,5745	37,5745	24,4601	24,46011	
		Ka	-38,3239	-15,6055	0	0	-70,95748	-53,349	-53,3487	-34,4915	-34,49151	
	42	Ki	-40,4847	-16,3979	0	0	-74,81828	-56,283	-56,2832	-36,4362	-36,43623	
		Lap	26,258	10,4283	0	0	48,19488	36,3307	36,3307	23,6322	23,6322	
		Ka	-19,0745	-7,7455	0	0	-35,2822	-26,534	-26,5344	-17,1671	-17,16705	

(sumber : Hasil Penelitian)

Tabel Geser perlu balok akibat beban kombinasi pada portal as-E

Lantai	No balok	Posisi balok	Geser (KN)				Geser perlu (KN)				
			Mati	Hidup	E. kiri	E. kanan	1,2D+1,6L	1,05(D+LR+ ϕ d.e)		0,9(D+E)	
								Ki	Ka	Ki	Ka
B M	25	Ki	-54,128	-21,543	0	0	-99,4224	-74,931	-74,9305	-48,7152	-48,7152
		Lap	8,059	0,957	0	0	11,202	9,26583	9,26583	7,2531	7,2531
		Ka	58,855	23,457	0	0	108,1572	81,5016	81,5016	52,9695	52,9695
	31	Ki	-56,592	-22,537	0	0	-103,9696	-78,353	-78,3527	-50,9328	-50,9328
		Lap	5,595	-0,037	0	0	6,6548	5,84367	5,84367	5,0355	5,0355
		Ka	56,391	22,463	0	0	103,61	78,0795	78,0795	50,7519	50,7519
	37	Ki	-58,773	-23,427	0	0	-108,0108	-81,39	-81,3903	-52,8957	-52,8957
		Lap	-7,977	-0,927	0	0	-11,0556	-9,1545	-9,15453	-7,1793	-7,1793
		Ka	54,21	21,573	0	0	99,5688	75,0418	75,0418	48,789	48,789
1	26	Ki	-52,86	-21,028	0	0	-97,0768	-73,167	-73,1665	-47,574	-47,574
		Lap	9,236	1,472	0	0	13,4384	10,9343	10,9343	8,3124	8,3124
		Ka	60,122	23,972	0	0	110,5016	83,2646	83,2646	54,1098	54,1098
	32	Ki	-56,768	-22,606	0	0	-104,2912	-78,595	-78,5954	-51,0912	-51,0912
		Lap	5,418	-0,106	0	0	6,332	5,59986	5,59986	4,8762	4,8762
		Ka	56,214	22,394	0	0	103,2872	77,8357	77,8357	50,5926	50,5926
	38	Ki	-59,86	-23,874	0	0	-110,0304	-82,907	-82,9072	-53,874	-53,874
		Lap	-9,064	-1,374	0	0	-13,0752	-10,671	-10,6714	-8,1576	-8,1576
		Ka	53,122	21,126	0	0	97,548	73,5239	73,5239	47,8098	47,8098
2	27	Ki	-51,76	-20,61	0	0	-95,088	-71,66	-71,6604	-46,584	-46,584
		Lap	10,426	1,89	0	0	15,5352	12,5349	12,5349	9,3834	9,3834
		Ka	61,222	24,39	0	0	112,4904	84,7707	84,7707	55,0998	55,0998
	33	Ki	-56,864	-22,594	0	0	-104,3872	-78,686	-78,6862	-51,1776	-51,1776
		Lap	5,323	-0,094	0	0	6,2372	5,51019	5,51019	4,7907	4,7907
		Ka	56,119	22,406	0	0	103,1924	77,746	77,746	50,5071	50,5071
	39	Ki	-60,808	-24,254	0	0	-111,776	-84,222	-84,2218	-54,7272	-54,7272
		Lap	-10,012	-1,754	0	0	-14,8208	-11,986	-11,986	-9,0108	-9,0108
		Ka	52,174	20,746	0	0	95,8024	72,2093	72,2093	46,9566	46,9566
3	28	Ki	-42,892	-18,957	0	0	-81,8016	-60,96	-60,9605	-38,6028	-38,6028
		Lap	7,904	3,543	0	0	15,1536	11,2753	11,2753	7,1136	7,1136
		Ka	58,7	26,043	0	0	112,1088	83,5111	83,5111	52,83	52,83
	34	Ki	-58,014	-23,508	0	0	-107,2296	-80,661	-80,6614	-52,2126	-52,2126
		Lap	-7,218	-1,008	0	0	-10,2744	-8,4256	-8,42562	-6,4962	-6,4962
		Ka	54,968	21,492	0	0	100,3488	75,7697	75,7697	49,4712	49,4712
	40	Ki	-62,869	-25,019	0	0	-115,4732	-87,028	-87,0284	-56,5821	-56,5821
		Lap	-12,073	-2,519	0	0	-18,518	-14,793	-14,7926	-10,8657	-10,8657
		Ka	50,113	19,981	0	0	92,1052	69,4027	69,4027	45,1017	45,1017
4	44	Ki	-30,186	-11,25	0	0	-54,2232	-41,145	-41,1453	-27,1674	-27,1674
		Lap	-15,093	-5,625	0	0	-27,1116	-20,573	-20,5727	-13,5837	-13,5837
		Ka	0	0	0	0	0	0	0	0	0
	35	Ki	-56,704	-22,338	0	0	-103,7856	-78,303	-78,3031	-51,0336	-51,0336
		Lap	-5,908	0,162	0	0	-6,8304	-6,0673	-6,06732	-5,3172	-5,3172
		Ka	56,278	22,662	0	0	103,7928	78,128	78,128	50,6502	50,6502
	41	Ki	-63,477	-25,384	0	0	-116,7868	-87,973	-87,9734	-57,1293	-57,1293
		Lap	-12,681	-2,884	0	0	-19,8316	-15,738	-15,7376	-11,4129	-11,4129
		Ka	49,506	19,616	0	0	90,7928	68,4587	68,4587	44,5554	44,5554
5	36	Ki	-25,418	-9,962	0	0	-46,4408	-35,057	-35,057	-22,8762	-22,8762
		Lap	5,07	1,288	0	0	8,1448	6,40542	6,40542	4,563	4,563
		Ka	31,728	12,538	0	0	58,1344	43,8463	43,8463	28,5552	28,5552
	42	Ki	-32,142	-12,692	0	0	-58,8776	-44,41	-44,4104	-28,9278	-28,9278
		Lap	-5,484	-1,442	0	0	-8,888	-6,9695	-6,96948	-4,9356	-4,9356
		Ka	25,005	9,808	0	0	45,6988	34,494	34,494	22,5045	22,5045

(sumber : Hasil Penelitian)

Tabel Momen perlu kolom akibat beban kombinasi pada portal as-E

Lantai	No kolom	Posisi kolom	Momen (KNm)						Momen perlu (KNm)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
B M	1	Atas	1,9425	36,2631	0,5933	14,6318	0	0	3,28028	66,9266	2,538	50,367	2,538	50,367	1,74825	32,6368	1,74825
		Bawah	-1,734	-16,5272	-0,5391	-6,6727	0	0	-2,94336	-30,509	-2,27354	-22,9586	-2,2735	-22,9586	-1,5606	-14,8745	-1,5606
	7	Atas	0,7459	-1,8197	0,3105	-0,7379	0	0	1,39188	-3,36428	1,04402	-2,53052	1,04402	-2,53052	0,67131	-1,63773	0,67131
		Bawah	0,0086	1,1073	0,0398	0,445	0	0	0,074	2,04076	0,04246	1,53647	0,04246	1,53647	0,00774	0,99657	0,00774
	13	Atas	0,7163	2,1075	0,2557	0,8493	0	0	1,26868	3,88788	0,9669	2,92629	0,9669	2,92629	0,64467	1,89675	0,64467
		Bawah	-0,4802	-1,0052	-0,1809	-0,4088	0	0	-0,86568	-1,86032	-0,65617	-1,39885	-0,6562	-1,39885	-0,43218	-0,90468	-0,4322
19	Atas	0,49	-36,2266	0,1322	-14,622	0	0	0,79952	-66,8678	0,62555	-50,3208	0,62555	-50,3208	0,441	-32,604	0,441	
	Bawah	-0,3182	16,7497	-0,0924	6,7572	0	0	-0,52968	30,9112	-0,41173	23,2632	-0,4117	23,2632	-0,28638	15,0747	-0,2864	
1	2	Atas	1,722	28,0177	0,5467	11,3338	0	0	2,94112	51,7553	2,26733	38,939	2,26733	38,939	1,5498	25,2159	1,5498
		Bawah	-1,3507	-22,7116	-0,432	-9,1793	0	0	-2,31204	-41,9408	-1,78112	-31,5578	-1,7811	-31,5578	-1,21563	-20,4404	-1,2156
	8	Atas	0,3674	-1,2972	0,1291	-0,5604	0	0	0,64744	-2,45328	0,49421	-1,8328	0,49421	-1,8328	0,33066	-1,16748	0,33066
		Bawah	0,0578	1,0739	0,0326	0,4498	0	0	0,12152	2,00836	0,08807	1,50543	0,08807	1,50543	0,05202	0,96651	0,05202
	14	Atas	0,7519	1,6528	0,2529	0,6753	0	0	1,30692	3,06384	1,00193	2,30269	1,00193	2,30269	0,67671	1,48752	0,67671
		Bawah	-0,3139	-1,1194	-0,1029	-0,4581	0	0	-0,54132	-2,07624	-0,41603	-1,56017	-0,416	-1,56017	-0,28251	-1,00746	-0,2825
20	Atas	0,537	-28,1588	0,1356	-11,367	0	0	0,86136	-51,9773	0,67775	-39,1148	0,67775	-39,1148	0,4833	-25,3429	0,4833	
	Bawah	-0,2299	22,9714	-0,057	9,2695	0	0	-0,36708	42,3969	-0,28928	31,9064	-0,2893	31,9064	-0,20691	20,6743	-0,2069	
2	3	Atas	1,8846	27,0186	0,6059	10,7567	0	0	3,23096	49,633	2,48779	37,4052	2,48779	37,4052	1,69614	24,3167	1,69614
		Bawah	-1,7637	-24,0046	-0,5656	-9,6399	0	0	-3,0214	-44,2294	-2,32699	-33,3023	-2,327	-33,3023	-1,58733	-21,6041	-1,5873
	9	Atas	0,8377	-1,3012	0,2943	-0,4339	0	0	1,47612	-2,25568	1,1268	-1,73074	1,1268	-1,73074	0,75393	-1,17108	0,75393
		Bawah	-0,5869	1,288	-0,2061	0,4879	0	0	-1,03404	2,32624	-0,78937	1,76224	-0,7894	1,76224	-0,52821	1,1592	-0,5282
	15	Atas	1,4579	2,0629	0,4982	0,8179	0	0	2,5466	3,78412	1,94928	2,85308	1,94928	2,85308	1,31211	1,85661	1,31211
		Bawah	-1,1253	-1,676	-0,3886	-0,6776	0	0	-1,97212	-3,09536	-1,50799	-2,32898	-1,508	-2,32898	-1,01277	-1,5084	-1,0128
21	Atas	1,0309	-27,6548	0,2652	-11,105	0	0	1,6614	-50,9534	1,30521	-38,3656	1,30521	-38,3656	0,92781	-24,8893	0,92781	
	Bawah	-0,7918	24,518	-0,2065	9,8655	0	0	-1,28056	45,2064	-1,00485	34,0309	-1,0049	34,0309	-0,71262	22,0662	-0,7126	

(Sumber : Hasil Per

Tabel Momen perlu kolom akibat beban kombinasi pada portal as-E (lanjutan)

Lantai	No kolom	Posisi kolom	Momen (KNm)						Momen perlu (KNm)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
3	4	Atas	2,8901	22,2873	0,8942	9,9416	0	0	4,89884	42,6513	3,78573	31,7526	3,78573	31,7526	2,60109	20,0586	2,60109
		Bawah	-2,1618	-19,0566	-0,676	-8,0354	0	0	-3,67576	-35,7246	-2,83773	-26,7592	-2,8377	-26,7592	-1,94562	-17,1509	-1,9456
	10	Atas	1,0278	-1,6019	0,3692	-1,3949	0	0	1,82408	-4,15412	1,38932	-2,85371	1,38932	-2,85371	0,92502	-1,44171	0,92502
		Bawah	-0,5796	1,2992	-0,206	0,9001	0	0	-1,02512	2,9992	-0,78162	2,12024	-0,7816	2,12024	-0,52164	1,16928	-0,5216
	16	Atas	1,6775	0,9058	0,6011	0,408	0	0	2,97476	1,73976	2,2663	1,29381	2,2663	1,29381	1,50975	0,81522	1,50975
		Bawah	-1,1472	-0,965	-0,3998	-0,3556	0	0	-2,01632	-1,72696	-1,54039	-1,31195	-1,5404	-1,31195	-1,03248	-0,8685	-1,0325
22	Atas	1,1524	-21,218	0,3144	-8,6658	0	0	1,88592	-39,3269	1,47412	-29,5582	1,47412	-29,5582	1,03716	-19,0962	1,03716	
	Bawah	-0,8042	19,0956	-0,2126	7,7797	0	0	-1,3052	35,3622	-1,02299	26,5853	-1,023	26,5853	-0,72378	17,186	-0,7238	
4	43	Atas	-1,8953	0	-0,5744	0	0	-3,1934	0	-2,47256	0	-2,4726	0	-1,70577	0	-1,7058	
		Bawah	-3,1E-15	0	-8,9E-16	0	0	-5,2E-15	0	-4E-15	0	-4E-15	0	-2,8E-15	0	-3E-15	
	11	Atas	-1,7078	9,308	-0,7389	3,8339	0	0	-3,2316	17,3038	-2,41387	12,9939	-2,4139	12,9939	-1,53702	8,3772	-1,537
		Bawah	-1,2131	-7,5954	-0,3608	-2,6219	0	0	-2,033	-13,3095	-1,57683	-10,1776	-1,5768	-10,1776	-1,09179	-6,83586	-1,0918
	17	Atas	-0,8362	7,4866	-0,6313	3,0716	0	0	-2,01352	13,8985	-1,4083	10,4411	-1,4083	10,4411	-0,75258	6,73794	-0,7526
		Bawah	-2,0385	-8,0181	-0,6048	-3,3985	0	0	-3,41388	-15,0593	-2,64846	-11,2737	-2,6485	-11,2737	-1,83465	-7,21629	-1,8347
23	Atas	-0,1574	-16,4022	-0,2606	-6,5239	0	0	-0,60584	-30,1209	-0,38417	-22,7024	-0,3842	-22,7024	-0,14166	-14,762	-0,1417	
	Bawah	-1,5448	16,0059	-0,3352	6,402	0	0	-2,39008	29,4503	-1,90361	22,1839	-1,9036	22,1839	-1,39032	14,4053	-1,3903	
5	12	Atas	20,0972	19,3955	6,9375	7,8761	0	0	35,21664	35,8764	26,9296	26,9812	26,9296	26,9812	18,0875	17,456	18,0875
		Bawah	-9,8036	-13,5524	-3,3751	-5,7145	0	0	-17,1645	-25,4061	-13,1289	-19,0302	-13,129	-19,0302	-8,82324	-12,1972	-8,8232
	18	Atas	27,662	2,1609	12,8141	0,7924	0	0	53,69696	3,86092	39,8089	2,93456	39,8089	2,93456	24,8958	1,94481	24,8958
		Bawah	-12,7095	-3,1846	-5,9483	-1,1448	0	0	-24,7687	-5,6532	-18,3415	-4,30546	-18,342	-4,30546	-11,4386	-2,86614	-11,439
	24	Atas	15,4918	-19,0745	6,1705	-7,7455	0	0	28,46296	-35,2822	21,4496	-26,5344	21,4496	-26,5344	13,9426	-17,1671	13,9426
		Bawah	-7,0191	19,2189	-2,842	7,7823	0	0	-12,9701	35,5144	-9,75734	26,717	-9,7573	26,717	-6,31719	17,297	-6,3172

(Sumber : Hasil Pe

Tabel Geser perlu kolom akibat beban kombinasi pada portal as-E

Lantai	No kolom	posisi kolom	Geser (KN)						Geser perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
B M	1	Atas	-1,225	-17,597	-0,377	-7,101	0	0	-2,0732	-32,478	-1,60293	-24,4417	-1,6029	-24,4417	-1,1025	-15,8373	-1,1025
		Bawah	-1,225	-17,597	-0,377	-7,101	0	0	-2,0732	-32,478	-1,60293	-24,4417	-1,6029	-24,4417	-1,1025	-15,8373	-1,1025
	7	Atas	-0,246	0,976	-0,09	0,394	0	0	-0,4392	1,8016	-0,3339	1,35576	-0,3339	1,35576	-0,2214	0,8784	-0,2214
		Bawah	-0,246	0,976	-0,09	0,394	0	0	-0,4392	1,8016	-0,3339	1,35576	-0,3339	1,35576	-0,2214	0,8784	-0,2214
	13	Atas	-0,399	-1,038	-0,146	-0,419	0	0	-0,7124	-1,916	-0,54159	-1,44186	-0,5416	-1,44186	-0,3591	-0,9342	-0,3591
		Bawah	-0,399	-1,038	-0,146	-0,419	0	0	-0,7124	-1,916	-0,54159	-1,44186	-0,5416	-1,44186	-0,3591	-0,9342	-0,3591
19	Atas	-0,269	17,659	-0,075	7,127	0	0	-0,4428	32,594	-0,34545	24,5286	-0,3455	24,5286	-0,2421	15,8931	-0,2421	
	Bawah	-0,269	17,659	-0,075	7,127	0	0	-0,4428	32,594	-0,34545	24,5286	-0,3455	24,5286	-0,2421	15,8931	-0,2421	
1	2	Atas	-0,768	-12,682	-0,245	-5,128	0	0	-1,3136	-23,4232	-1,0122	-17,6236	-1,0122	-17,6236	-0,6912	-11,4138	-0,6912
		Bawah	-0,768	-12,682	-0,245	-5,128	0	0	-1,3136	-23,4232	-1,0122	-17,6236	-1,0122	-17,6236	-0,6912	-11,4138	-0,6912
	8	Atas	-0,077	0,593	-0,024	0,253	0	0	-0,1308	1,1164	-0,10101	0,83517	-0,101	0,83517	-0,0693	0,5337	-0,0693
		Bawah	-0,077	0,593	-0,024	0,253	0	0	-0,1308	1,1164	-0,10101	0,83517	-0,101	0,83517	-0,0693	0,5337	-0,0693
	14	Atas	-0,266	-0,693	-0,089	-0,283	0	0	-0,4616	-1,2844	-0,35406	-0,96537	-0,3541	-0,96537	-0,2394	-0,6237	-0,2394
		Bawah	-0,266	-0,693	-0,089	-0,283	0	0	-0,4616	-1,2844	-0,35406	-0,96537	-0,3541	-0,96537	-0,2394	-0,6237	-0,2394
20	Atas	-0,192	12,783	-0,048	5,159	0	0	-0,3072	23,594	-0,24192	17,7557	-0,2419	17,7557	-0,1728	11,5047	-0,1728	
	Bawah	-0,192	12,783	-0,048	5,159	0	0	-0,3072	23,594	-0,24192	17,7557	-0,2419	17,7557	-0,1728	11,5047	-0,1728	
2	3	Atas	-1,013	-14,173	-0,325	-5,666	0	0	-1,7356	-26,0732	-1,33665	-19,6411	-1,3367	-19,6411	-0,9117	-12,7557	-0,9117
		Bawah	-1,013	-14,173	-0,325	-5,666	0	0	-1,7356	-26,0732	-1,33665	-19,6411	-1,3367	-19,6411	-0,9117	-12,7557	-0,9117
	9	Atas	-0,396	0,719	-0,139	0,256	0	0	-0,6976	1,2724	-0,53256	0,96999	-0,5326	0,96999	-0,3564	0,6471	-0,3564
		Bawah	-0,396	0,719	-0,139	0,256	0	0	-0,6976	1,2724	-0,53256	0,96999	-0,5326	0,96999	-0,3564	0,6471	-0,3564
	15	Atas	-0,718	-1,039	-0,246	-0,415	0	0	-1,2552	-1,9108	-0,96054	-1,43955	-0,9605	-1,43955	-0,6462	-0,9351	-0,6462
		Bawah	-0,718	-1,039	-0,246	-0,415	0	0	-1,2552	-1,9108	-0,96054	-1,43955	-0,9605	-1,43955	-0,6462	-0,9351	-0,6462
21	Atas	-0,506	14,492	-0,131	5,825	0	0	-0,8168	26,7104	-0,64134	20,1096	-0,6413	20,1096	-0,4554	13,0428	-0,4554	
	Bawah	-0,506	14,492	-0,131	5,825	0	0	-0,8168	26,7104	-0,64134	20,1096	-0,6413	20,1096	-0,4554	13,0428	-0,4554	

(Sumber : Hasil Pe

Tabel Geser perlu kolom akibat beban kombinasi pada portal as-E (lanjutan)

Lantai	No kolom	posisi kolom	Geser (KN)						Geser perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
3	4	Atas	-1,403	-11,484	-0,436	-4,994	0	0	-2,3812	-21,7712	-1,83939	-16,2532	-1,8394	-16,2532	-1,2627	-10,3356	-1,2627
		Bawah	-1,403	-11,484	-0,436	-4,994	0	0	-2,3812	-21,7712	-1,83939	-16,2532	-1,8394	-16,2532	-1,2627	-10,3356	-1,2627
	10	Atas	-0,446	0,806	-0,16	0,638	0	0	-0,7912	1,988	-0,6027	1,38222	-0,6027	1,38222	-0,4014	0,7254	-0,4014
		Bawah	-0,446	0,806	-0,16	0,638	0	0	-0,7912	1,988	-0,6027	1,38222	-0,6027	1,38222	-0,4014	0,7254	-0,4014
	16	Atas	-0,785	-0,52	-0,278	-0,212	0	0	-1,3868	-0,9632	-1,05777	-0,72408	-1,0578	-0,72408	-0,7065	-0,468	-0,7065
		Bawah	-0,785	-0,52	-0,278	-0,212	0	0	-1,3868	-0,9632	-1,05777	-0,72408	-1,0578	-0,72408	-0,7065	-0,468	-0,7065
22	Atas	-0,544	11,198	-0,146	4,568	0	0	-0,8864	20,7464	-0,69384	15,595	-0,6938	15,595	-0,4896	10,0782	-0,4896	
	Bawah	-0,544	11,198	-0,146	4,568	0	0	-0,8864	20,7464	-0,69384	15,595	-0,6938	15,595	-0,4896	10,0782	-0,4896	
4	43	Atas	0,526	0	0,16	0	0	0	0,8872	0	0,6867	0	0,6867	0	0,4734	0	0,4734
		Bawah	0,526	0	0,16	0	0	0	0,8872	0	0,6867	0	0,6867	0	0,4734	0	0,4734
	11	Atas	0,137	-4,695	0,105	-1,793	0	0	0,3324	-8,5028	0,23205	-6,43587	0,23205	-6,43587	0,1233	-4,2255	0,1233
		Bawah	0,137	-4,695	0,105	-1,793	0	0	0,3324	-8,5028	0,23205	-6,43587	0,23205	-6,43587	0,1233	-4,2255	0,1233
	17	Atas	-0,334	-4,307	0,00735	-1,797	0	0	-0,38904	-8,0436	-0,34452	-6,03183	-0,3445	-6,03183	-0,3006	-3,8763	-0,3006
		Bawah	-0,334	-4,307	0,00735	-1,797	0	0	-0,38904	-8,0436	-0,34452	-6,03183	-0,3445	-6,03183	-0,3006	-3,8763	-0,3006
	23	Atas	-0,385	9,002	-0,021	3,591	0	0	-0,4956	16,548	-0,42189	12,4685	-0,4219	12,4685	-0,3465	8,1018	-0,3465
		Bawah	-0,385	9,002	-0,021	3,591	0	0	-0,4956	16,548	-0,42189	12,4685	-0,4219	12,4685	-0,3465	8,1018	-0,3465
5	12	Atas	-8,306	-9,152	-2,865	-3,775	0	0	-14,5512	-17,0224	-11,1279	-12,7806	-11,128	-12,7806	-7,4754	-8,2368	-7,4754
		Bawah	-8,306	-9,152	-2,865	-3,775	0	0	-14,5512	-17,0224	-11,1279	-12,7806	-11,128	-12,7806	-7,4754	-8,2368	-7,4754
	18	Atas	-11,214	-1,485	-5,212	-0,538	0	0	-21,796	-2,6428	-16,1528	-2,01117	-16,153	-2,01117	-10,0926	-1,3365	-10,093
		Bawah	-11,214	-1,485	-5,212	-0,538	0	0	-21,796	-2,6428	-16,1528	-2,01117	-16,153	-2,01117	-10,0926	-1,3365	-10,093
	24	Atas	-6,253	10,637	-2,503	4,313	0	0	-11,5084	19,6652	-8,66817	14,7918	-8,6682	14,7918	-5,6277	9,5733	-5,6277
		Bawah	-6,253	10,637	-2,503	4,313	0	0	-11,5084	19,6652	-8,66817	14,7918	-8,6682	14,7918	-5,6277	9,5733	-5,6277

(Sumber : Hasil Pe

Tabel Aksial perlu kolom akibat beban kombinasi pada portal as-E

Lantai	No kolom	Posisi kolom	Aksial (KN)						Aksial perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ω d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
B M	1	Atas	-451,876	-451,876	-180	-180	0	0	-830,251	-830,251	-625,669	-625,669	-625,67	-625,669	-406,688	-406,688	-406,69
		Bawah	-465,376	-465,376	-180	-180	0	0	-846,451	-846,451	-639,844	-639,844	-639,84	-639,844	-418,838	-418,838	-418,84
	7	Atas	-1032,13	-1032,13	-450	-450	0	0	-1958,56	-1958,56	-1461,74	-1461,74	-1461,7	-1461,74	-928,92	-928,92	-928,92
		Bawah	-1045,63	-1045,63	-450	-450	0	0	-1974,76	-1974,76	-1475,92	-1475,92	-1475,9	-1475,92	-941,07	-941,07	-941,07
	13	Atas	-1118,39	-1118,39	-495	-495	0	0	-2134,06	-2134,06	-1590,11	-1590,11	-1590,1	-1590,11	-1006,55	-1006,55	-1006,5
		Bawah	-1131,89	-1131,89	-495	-495	0	0	-2150,26	-2150,26	-1604,28	-1604,28	-1604,3	-1604,28	-1018,7	-1018,7	-1018,7
19	Atas	-621,014	-621,014	-247	-247	0	0	-1140,42	-1140,42	-859,545	-859,545	-859,54	-859,545	-558,913	-558,913	-558,91	
	Bawah	-643,514	-643,514	-247	-247	0	0	-1167,42	-1167,42	-883,17	-883,17	-883,17	-883,17	-579,163	-579,163	-579,16	
1	2	Atas	-336,382	-336,382	-135	-135	0	0	-619,658	-619,658	-466,601	-466,601	-466,6	-466,601	-302,743	-302,743	-302,74
		Bawah	-343,102	-343,102	-135	-135	0	0	-627,722	-627,722	-473,657	-473,657	-473,66	-473,657	-308,791	-308,791	-308,79
	8	Atas	-825,422	-825,422	-360	-360	0	0	-1566,51	-1566,51	-1169,09	-1169,09	-1169,1	-1169,09	-742,88	-742,88	-742,88
		Bawah	-832,142	-832,142	-360	-360	0	0	-1574,57	-1574,57	-1176,15	-1176,15	-1176,1	-1176,15	-748,928	-748,928	-748,93
	14	Atas	-918,395	-918,395	-405	-405	0	0	-1750,07	-1750,07	-1304,52	-1304,52	-1304,5	-1304,52	-826,556	-826,556	-826,56
		Bawah	-925,115	-925,115	-405	-405	0	0	-1758,14	-1758,14	-1311,57	-1311,57	-1311,6	-1311,57	-832,604	-832,604	-832,6
20	Atas	-505,52	-505,52	-202	-202	0	0	-929,824	-929,824	-700,476	-700,476	-700,48	-700,476	-454,968	-454,968	-454,97	
	Bawah	-512,24	-512,24	-202	-202	0	0	-937,888	-937,888	-707,532	-707,532	-707,53	-707,532	-461,016	-461,016	-461,02	
2	3	Atas	-222,572	-222,572	-90	-90	0	0	-411,086	-411,086	-309,3	-309,3	-309,3	-309,3	-200,315	-200,315	-200,31
		Bawah	-227,129	-227,129	-90	-90	0	0	-416,555	-416,555	-314,085	-314,085	-314,09	-314,085	-204,416	-204,416	-204,42
	9	Atas	-620,234	-620,234	-270	-270	0	0	-1176,28	-1176,28	-878,046	-878,046	-878,05	-878,046	-558,211	-558,211	-558,21
		Bawah	-624,791	-624,791	-270	-270	0	0	-1181,75	-1181,75	-882,831	-882,831	-882,83	-882,831	-562,312	-562,312	-562,31
	15	Atas	-713,208	-713,208	-315	-315	0	0	-1359,85	-1359,85	-1013,47	-1013,47	-1013,5	-1013,47	-641,887	-641,887	-641,89
		Bawah	-717,765	-717,765	-315	-315	0	0	-1365,32	-1365,32	-1018,25	-1018,25	-1018,3	-1018,25	-645,989	-645,989	-645,99
21	Atas	-391,711	-391,711	-157,5	-157,5	0	0	-722,053	-722,053	-543,596	-543,596	-543,6	-543,596	-352,54	-352,54	-352,54	
	Bawah	-396,267	-396,267	-157,5	-157,5	0	0	-727,521	-727,521	-548,381	-548,381	-548,38	-548,381	-356,641	-356,641	-356,64	

(Sumber : Hasil Per

Tabel Aksial perlu kolom akibat beban kombinasi pada portal as-E (lanjutan)

Lantai	No kolom	Posisi kolom	Aksial (KN)						Aksial perlu (KN)								
			Mati		Hidup		E. ki	E. ka	1,2D+1,6L		1,05(D+LR+ ϕ d.e)				0,9(D+E)		
			arah x	arah y	arah x	arah y			arah x	arah y	Ki		Ka		Ki		K
							arah x	arah y			arah x	arah y	arah x	arah y	arah x	arah y	
3	4	Atas	-109,732	-109,732	-45	-45	0	0	-203,678	-203,678	-153,018	-153,018	-153,02	-153,018	-98,7584	-98,7584	-98,758
		Bawah	-113,08	-113,08	-45	-45	0	0	-207,696	-207,696	-156,534	-156,534	-156,53	-156,534	-101,772	-101,772	-101,77
	10	Atas	-415,937	-415,937	-180	-180	0	0	-787,124	-787,124	-587,934	-587,934	-587,93	-587,934	-374,343	-374,343	-374,34
		Bawah	-419,285	-419,285	-180	-180	0	0	-791,142	-791,142	-591,449	-591,449	-591,45	-591,449	-377,356	-377,356	-377,36
	16	Atas	-508,91	-508,91	-225	-225	0	0	-970,692	-970,692	-723,356	-723,356	-723,36	-723,356	-458,019	-458,019	-458,02
		Bawah	-512,258	-512,258	-225	-225	0	0	-974,71	-974,71	-726,871	-726,871	-726,87	-726,871	-461,033	-461,033	-461,03
22	Atas	-278,87	-278,87	-112,5	-112,5	0	0	-514,644	-514,644	-387,314	-387,314	-387,31	-387,314	-250,983	-250,983	-250,98	
	Bawah	-282,218	-282,218	-112,5	-112,5	0	0	-518,662	-518,662	-390,829	-390,829	-390,83	-390,829	-253,997	-253,997	-254	
4	43	Atas	-64,0428	-64,0428	-22,5	-22,5	0	0	-112,851	-112,851	-86,1449	-86,1449	-86,145	-86,1449	-57,6385	-57,6385	-57,639
		Bawah	-66,2748	-66,2748	-22,5	-22,5	0	0	-115,53	-115,53	-88,4885	-88,4885	-88,489	-88,4885	-59,6473	-59,6473	-59,647
	11	Atas	-211,32	-211,32	-90	-90	0	0	-397,584	-397,584	-297,486	-297,486	-297,49	-297,486	-190,188	-190,188	-190,19
		Bawah	-214,668	-214,668	-90	-90	0	0	-401,602	-401,602	-301,001	-301,001	-301	-301,001	-193,201	-193,201	-193,2
	17	Atas	-304,294	-304,294	-135	-135	0	0	-581,152	-581,152	-432,908	-432,908	-432,91	-432,908	-273,864	-273,864	-273,86
		Bawah	-307,642	-307,642	-135	-135	0	0	-585,17	-585,17	-436,424	-436,424	-436,42	-436,424	-276,877	-276,877	-276,88
23	Atas	-165,791	-165,791	-67,5	-67,5	0	0	-306,949	-306,949	-230,78	-230,78	-230,78	-230,78	-149,212	-149,212	-149,21	
	Bawah	-169,139	-169,139	-67,5	-67,5	0	0	-310,967	-310,967	-234,296	-234,296	-234,3	-234,296	-152,225	-152,225	-152,22	
5	12	Atas	-52,7112	-52,7112	-22,5	-22,5	0	0	-99,2534	-99,2534	-74,2468	-74,2468	-74,247	-74,2468	-47,4401	-47,4401	-47,44
		Bawah	-56,0592	-56,0592	-22,5	-22,5	0	0	-103,271	-103,271	-77,7622	-77,7622	-77,762	-77,7622	-50,4533	-50,4533	-50,453
	18	Atas	-99,6768	-99,6768	-45	-45	0	0	-191,612	-191,612	-142,461	-142,461	-142,46	-142,461	-89,7091	-89,7091	-89,709
		Bawah	-103,025	-103,025	-45	-45	0	0	-195,63	-195,63	-145,976	-145,976	-145,98	-145,976	-92,7223	-92,7223	-92,722
	24	Atas	-52,7112	-52,7112	-22,5	-22,5	0	0	-99,2534	-99,2534	-74,2468	-74,2468	-74,247	-74,2468	-47,4401	-47,4401	-47,44
		Bawah	-56,0592	-56,0592	-22,5	-22,5	0	0	-103,271	-103,271	-77,7622	-77,7622	-77,762	-77,7622	-50,4533	-50,4533	-50,453

(Sumber : Hasil Pe

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32,6368
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-32,604
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25,2159
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-1,16748
0,96651
1,48752
-1,00746
-25,3429
20,6743
24,3167
-21,6041
-1,17108
1,1592
1,85661
-1,5084
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-418,838
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-941,07
-1006,55
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-558,913
-579,163
-302,743
-308,791
-742,88
-748,928
-826,556
-832,604
-454,968
-461,016
-200,315
-204,416
-558,211
-562,312
-641,887
-645,989
-352,54
-356,641

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ca
arah y
-98,7584
-101,772
-374,343
-377,356
-458,019
-461,033
-250,983
-253,997
-57,6385
-59,6473
-190,188
-193,201
-273,864
-276,877
-149,212
-152,225
-47,4401
-50,4533
-89,7091
-92,7223
-47,4401
-50,4533

rhitungan)

Momen tersedia negatif

lantai	No blk	Psisi blk	T atas	T bawah	Luas	As	As'	d	ρ_1	ρ_{maks}
B M	25	Ki	4D20	3D20	314,00	1256	942	440	0,203896	2,991
		Lap	3D20	3D20	314,00	942	942	440	0	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	31	Ki	5D20	3D20	314,00	1570	942	440	0,407792	2,991
		Lap	3D20	3D20	314,00	942	942	440	0	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	37	Ki	5D20	3D20	314,00	1570	942	440	0,407792	2,991
		Lap	3D20	3D20	314,00	942	942	440	0	2,991
		Ka	4D20	3D20	314,00	1256	942	440	0,203896	2,991
1	26	Ki	4D20	3D20	314,00	1256	942	440	0,203896	2,991
		Lap	3D20	4D20	314,00	1256	942	440	0,203896	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	32	Ki	5D20	3D20	314,00	1570	942	440	0,407792	2,991
		Lap	3D20	3D20	314,00	942	942	440	0	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	38	Ki	5D20	3D20	314,00	1570	942	440	0,407792	2,991
		Lap	3D20	4D20	314,00	1256	942	440	0,203896	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
2	27	Ki	3D20	3D20	314,00	942	942	440	0	2,991
		Lap	3D20	4D20	314,00	1256	942	440	0,203896	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	33	Ki	5D20	3D20	314,00	1570	942	440	0,407792	2,991
		Lap	3D20	3D20	314,00	942	942	440	0	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	39	Ki	5D20	3D20	314,00	1570	942	440	0,407792	2,991
		Lap	3D20	4D20	314,00	1256	942	440	0,203896	2,991
		Ka	3D20	3D20	314,00	942	942	440	0	2,991
3	28	Ki	3D20	3D20	314,00	942	942	440	0	2,991
		Lap	3D20	4D20	314,00	1256	942	440	0,203896	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	34	Ki	6D20	3D20	314,00	1884	942	420	0,640816	2,991
		Lap	3D20	3D20	314,00	942	942	440	0	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	40	Ki	5D20	3D20	314,00	1570	942	440	0,407792	2,991
		Lap	3D20	4D20	314,00	1256	942	440	0,203896	2,991
		Ka	3D20	3D20	314,00	942	942	440	0	2,991
4	44	Ki	3D20	3D20	314,00	942	942	440	0	2,991
		Lap	3D20	3D20	314,00	942	942	440	0	2,991
		Ka	3D20	3D20	314,00	942	942	440	0	2,991
	35	Ki	5D20	3D20	314,00	1570	942	440	0,407792	2,991
		Lap	3D20	3D20	314,00	942	942	440	0	2,991
		Ka	5D20	3D20	314,00	1570	942	440	0,407792	2,991
	41	Ki	6D20	3D20	314,00	1884	942	420	0,640816	2,991
		Lap	3D20	4D20	314,00	1256	942	440	0,203896	2,991
		Ka	3D20	3D20	314,00	942	942	440	0	2,991
5	36	Ki	2D20	2D20	314,00	628	628	340	0	2,991
		Lap	2D20	3D20	314,00	942	628	340	0,307843	2,991
		Ka	3D20	2D20	314,00	942	628	340	0,307843	2,991
	42	Ki	3D20	2D20	314,00	942	628	340	0,307843	2,991
		Lap	2D20	3D20	314,00	942	628	340	0,307843	2,991
		Ka	2D20	2D20	314,00	628	628	340	0	2,991

a_l	a_{eleh}	p	q	$\sqrt{p^2 + q}$	a	f_s^l	Mnc	Mns
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
39,17876	95,14925	3,039731	4306,28571	65,69266	62,65293	111,59507	163,00309	37,84412
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
26,11917	95,14925	9,569524	4306,28571	66,31637	56,74685	60,763025	156,35604	21,75073
39,17876	95,14925	3,039731	4306,28571	65,69266	62,65293	111,59507	163,00309	37,84412
13,05959	95,14925	16,09932	4306,28571	67,56829	51,46897	5,4670532	142,72294	1,956986
0	95,14925	22,62911	4306,28571	69,41442	46,78532	-54,05138	130,46859	-19,34823
0	95,14925	17,60042	3349,33333	60,49056	42,89014	-113,4506	78,390697	-19,94916
15,23618	95,14925	9,982327	3349,33333	58,72802	48,74569	-27,74778	88,2741	-4,87917
15,23618	95,14925	9,982327	3349,33333	58,72802	48,74569	-27,74778	88,2741	-4,87917
15,23618	95,14925	9,982327	3349,33333	58,72802	48,74569	-27,74778	88,2741	-4,87917
15,23618	95,14925	9,982327	3349,33333	58,72802	48,74569	-27,74778	88,2741	-4,87917
0	95,14925	17,60042	3349,33333	60,49056	42,89014	-113,4506	78,390697	-19,94916
		24,76314	4712,38896	72,97672	48,21358	-34,67594	191,74439	-19,40452

Mn	Mt ⁽⁻⁾	Mu	
144,67992	115,74394	108,8674	115,74394
111,12036	88,896285	0	88,89628
178,10677	142,48542	135,0683	142,48542
178,10677	142,48542	129,6955	142,48542
111,12036	88,896285	0	88,89628
178,10677	142,48542	128,6224	142,48542
178,10677	142,48542	134,5863	142,48542
111,12036	88,896285	0	88,89628
144,67992	115,74394	109,2644	115,74394
144,67992	115,74394	95,98468	115,74394
144,67992	115,74394	0	115,74394
178,10677	142,48542	136,2623	142,48542
178,10677	142,48542	131,4825	142,48542
111,12036	88,896285	0	88,89628
178,10677	142,48542	128,4676	142,48542
178,10677	142,48542	134,6268	142,48542
144,67992	115,74394	0	115,74394
178,10677	142,48542	97,1838	142,48542
111,12036	88,896285	85,35732	88,89628
144,67992	115,74394	0	115,74394
178,10677	142,48542	137,5606	142,48542
178,10677	142,48542	132,3056	142,48542
111,12036	88,896285	0	88,89628
178,10677	142,48542	128,7258	142,48542
178,10677	142,48542	134,2368	142,48542
144,67992	115,74394	0	115,74394
111,12036	88,896285	86,31568	88,89628
111,12036	88,896285	42,65132	88,89628
144,67992	115,74394	0	115,74394
178,10677	142,48542	133,5733	142,48542
200,84721	160,67777	142,7288	160,67777
111,12036	88,896285	0	88,89628
178,10677	142,48542	122,0866	142,48542
178,10677	142,48542	138,8855	142,48542
144,67992	115,74394	0	115,74394
111,12036	88,896285	68,77716	88,89628
111,12036	88,896285	81,3348	88,89628
111,12036	88,896285	14,9922	88,89628
111,12036	88,896285	0	88,89628
178,10677	142,48542	124,0446	142,48542
111,12036	88,896285	0	88,89628
178,10677	142,48542	124,0644	142,48542
200,84721	160,67777	143,6161	160,67777
144,67992	115,74394	0	115,74394
111,12036	88,896285	65,63524	88,89628
58,441537	46,75323	35,87636	46,75323
83,39493	66,715944	0	75,31257
83,39493	66,715944	70,95748	75,31257
83,39493	66,715944	74,81828	75,31257
83,39493	66,715944	0	75,31257
58,441537	46,75323	35,2822	46,75323
172,33987			

Tabel VII.11 Perbandingan dimensi kolom di lapangan dan hasil perhitungan portal as-E

Lantai	No kolom	Dimensi kolom		Nilai banding
		Terpasang di lapangan	Hasil hitungan	
B M	1	500/500	500/500	1
	7	500/500	500/500	1
	13	500/500	500/500	1
	19	500/500	500/500	1
1	2	400/400	400/400	1
	8	400/400	400/400	1
	14	400/400	400/400	1
	20	400/400	400/400	1
2	3	350/350	350/350	1
	9	350/350	350/350	1
	15	350/350	350/350	1
	21	350/350	350/350	1
3	4	300/300	300/300	1
	10	300/300	300/300	1
	16	300/300	300/300	1
	22	300/300	300/300	1
4	43	200/300	200/300	1
	11	300/300	300/300	1
	17	300/300	300/300	1
	23	300/300	300/300	1
5	12	300/300	300/300	1
	18	300/300	300/300	1
	24	300/300	300/300	1

(Sumber : Hasil Hitungan)

Tabel V.6. Panjang penyaluran portal as-E

Lantai	No. balok	Posisi balok	Momen tersedia (KNm)		$A_{s,perlu}$ (mm ²)		L_d (mm)	
			Negatif	Positif	Negatif	Positif	Negatif	Positif
B M	25	Ki	115,74394	115,74394	1176,32748	774,42528	483,83024	424,70074
		Ka	142,48542	142,48542	1482,11259	774,42528	487,68112	424,70074
	31	Ki	142,48542	142,48542	1418,5758	774,42528	466,77469	424,70074
		Ka	142,48542	142,48542	1405,93843	774,42528	462,61634	424,70074
	37	Ki	142,48542	142,48542	1476,39452	774,42528	485,79962	424,70074
		Ka	115,74394	115,74394	1180,88655	774,42528	485,70541	424,70074
1	26	Ki	115,74394	115,74394	1029,56608	774,42528	423,46643	424,70074
		Ka	142,48542	142,48542	1496,29276	774,42528	492,34703	424,70074
	32	Ki	142,48542	142,48542	1439,65919	774,42528	473,71206	424,70074
		Ka	142,48542	142,48542	1404,11687	774,42528	462,01705	424,70074
	38	Ki	142,48542	142,48542	1476,87484	774,42528	485,95767	424,70074
		Ka	142,48542	142,48542	1043,13126	774,42528	343,23669	424,70074
2	27	Ki	88,89628	88,89628	910,17463	774,42528	499,14672	424,70074
		Ka	142,48542	142,48542	1511,73678	774,42528	497,4288	424,70074
	33	Ki	142,48542	142,48542	1449,38667	774,42528	476,9128	424,70074
		Ka	142,48542	142,48542	1407,154901	774,42528	463,0167	424,70074
	39	Ki	142,48542	142,48542	1472,25105	774,42528	484,43624	424,70074
		Ka	88,89628	88,89628	920,88064	774,42528	505,01798	424,70074
3	28	Ki	88,89628	88,89628	774,42528	774,42528	424,70074	424,70074
		Ka	142,48542	142,48542	1464,38855	774,42528	481,84912	424,70074
	34	Ki	160,67777	160,67777	1573,47805	774,42528	431,45369	424,70074
		Ka	142,48542	142,48542	1329,34189	774,42528	437,41275	424,70074
	40	Ki	142,48542	142,48542	1527,52416	774,42528	502,62355	424,70074
		Ka	88,89628	88,89628	774,42528	774,42528	424,70074	424,70074
4	44	Ki	88,89628	88,89628	865,36707	774,42528	474,53792	424,70074
		Ka	88,89628	88,89628	774,42528	774,42528	424,70074	424,70074
	35	Ki	142,48542	142,48542	1352,22189	774,42528	444,94129	424,70074
		Ka	142,48542	142,48542	1352,45402	774,42528	445,01767	424,70074
	41	Ki	160,67777	160,67777	1584,12045	774,42528	434,37188	424,70074
		Ka	88,89628	88,89628	774,42528	774,42528	424,70074	424,70074
5	36	Ki	46,75323	46,75323	512,931034	512,931034	421,94295	424,70074
		Ka	75,31257	75,31257	855,39246	512,931034	469,10376	424,70074
	42	Ki	75,31257	75,31257	905,73732	512,931034	496,71327	424,70074
		Ka	46,75323	46,75323	512,931034	512,931034	421,94295	424,70074

(Sumber : Hasil Perhitungan)



Tabel VII.4 Perbandingan luas tulangan lentur balok terpasang di lapangan dan hasil hitungan pada portal as-E

Lantai	No. balok	Posisi balok	Luas tulangan (mm ²)				Nilai banding			
			Di lapangan		Hasil hitungan		Atas		Bawah	
			Atas	Bawah	Atas	Bawah	Ujung	Lapangan	Ujung	Lapangan
B M	25	Ki	1005	603	1256	942	1,24975124		1,56218905	
		Lap	603	1005	942	942		1,56218905		0,93731343
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	31	Ki	1005	603	1570	942	1,56218905		1,56218905	
		Lap	603	1005	942	942		1,56218905		0,93731343
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	37	Ki	1005	603	1570	942	1,56218905		1,56218905	
		Lap	603	1005	942	942		1,56218905		0,93731343
		Ka	1005	603	1256	942	1,24975124		1,56218905	
1	26	Ki	1005	603	1256	942	1,24975124		1,56218905	
		Lap	603	1005	942	1256		1,56218905		1,24975124
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	32	Ki	1005	603	1570	942	1,56218905		1,56218905	
		Lap	603	1005	942	942		1,56218905		0,93731343
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	38	Ki	1005	603	1570	942	1,56218905		1,56218905	
		Lap	603	1005	942	1256		1,56218905		1,24975124
		Ka	1005	603	1570	942	1,56218905		1,56218905	
2	27	Ki	1005	603	942	942	0,93731343		1,56218905	
		Lap	603	1005	942	1256		1,56218905		1,24975124
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	33	Ki	1005	603	1570	942	1,56218905		1,56218905	
		Lap	603	1005	942	942		1,56218905		0,93731343
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	39	Ki	1005	603	1570	942	1,56218905		1,56218905	
		Lap	603	1005	942	1256		1,56218905		1,24975124
		Ka	1005	603	942	942	0,93731343		1,56218905	
3	28	Ki	1005	603	942	942	0,93731343		1,56218905	
		Lap	603	1005	942	1256		1,56218905		1,24975124
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	34	Ki	1005	603	1884	942	1,87462687		1,56218905	
		Lap	603	1005	942	942		1,56218905		0,93731343
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	40	Ki	1005	603	1570	942	1,56218905		1,56218905	
		Lap	603	1005	942	1256		1,56218905		1,24975124
		Ka	1005	603	942	942	0,93731343		1,56218905	
4	44	Ki	603	603	942	942	1,56218905		1,56218905	
		Lap	603	603	942	942		1,56218905		1,56218905
		Ka	603	603	942	942	1,56218905		1,56218905	
	35	Ki	1005	603	1570	942	1,56218905		1,56218905	
		Lap	603	1005	942	942		1,56218905		0,93731343
		Ka	1005	603	1570	942	1,56218905		1,56218905	
	41	Ki	1005	603	1884	942	1,87462687		1,56218905	
		Lap	603	1005	942	1256		1,56218905		1,24975124
		Ka	1005	603	942	942	0,93731343		1,56218905	
5	36	Ki	804	402	628	628	0,78109453		1,56218905	
		Lap	402	804	628	942		1,56218905		1,17164179
		Ka	804	402	942	628	1,17164179		1,56218905	
	42	Ki	804	402	942	628	1,17164179		1,56218905	
		Lap	402	804	628	942		1,56218905		1,17164179
		Ka	804	402	628	628	0,78109453		1,56218905	
							$\Sigma n = 47.3343$	$\Sigma n = 26.5572$	$\Sigma n = 53.1144$	$\Sigma n = 19.2149$

(Sumber : Hasil Hitungan)

4D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	3D20
4D20	3D20
4D20	3D20
3D20	4D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	4D20
5D20	3D20
3D20	3D20
3D20	4D20
5D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	4D20
3D20	3D20
3D20	3D20
3D20	4D20
5D20	3D20
6D20	3D20
3D20	3D20
5D20	3D20
5D20	3D20
3D20	4D20
3D20	3D20
3D20	3D20
3D20	3D20
3D20	3D20
5D20	3D20
3D20	3D20
5D20	3D20
6D20	3D20
3D20	4D20
3D20	3D20
2D20	2D20
2D20	3D20
3D20	2D20
3D20	2D20
2D20	3D20
2D20	2D20

1256

Tabel VII.13 Susunan tulangan memanjang kolom terpasang di lapangan dan hasil hitungan porta

Lantai	No kolom	Susunan tulangan	
		Terpasang di lapangan	Hasil hitungan
B M	1	8D25	12D25
	7	8D25	12D25
	13	8D25	12D25
	19	8D25	12D25
1	2	8D25	8D25
	8	8D25	8D25
	14	8D25	8D25
	20	8D25	8D25
2	3	8D20	8D20
	9	8D20	8D20
	15	8D20	8D20
	21	8D20	8D20
3	4	8D16	10D16
	10	8D16	10D16
	16	8D16	10D16
	22	8D16	10D16
4	43	6D16	6D16
	11	8D16	10D16
	17	8D16	10D16
	23	8D16	10D16
5	12	8D16	10D16
	18	8D16	10D16
	24	8D16	10D16

(Sumber : Hasil Perhitungan)

al as-E

Tabel VII.18 Luas tulangan geser kolom terpasang di lapangan dan hasil hitungan portal as-E

Lantai	No kolom	Luas tulangan geser kolom (mm ²)				Nilai banding	
		Terpasang di lapangan		Hasil hitungan		Dalam sendi plastis	Luar sendi plastis
		Dalam sendi plastis	Luar sendi plastis	Dalam sendi plastis	Luar sendi plastis		
B M	1	669,86667	669,86667	608,9697	608,9697	0,90909091	0,90909091
	7	669,86667	669,86667	608,9697	608,9697	0,90909091	0,90909091
	13	669,86667	669,86667	608,9697	608,9697	0,90909091	0,90909091
	19	669,86667	669,86667	608,9697	608,9697	0,90909091	0,90909091
1	2	669,86667	669,86667	591,05882	591,05882	0,88235293	0,88235293
	8	669,86667	669,86667	591,05882	591,05882	0,88235293	0,88235293
	14	669,86667	669,86667	591,05882	591,05882	0,88235293	0,88235293
	20	669,86667	669,86667	591,05882	591,05882	0,88235293	0,88235293
2	3	669,86667	669,86667	692,96552	692,96552	1,03448276	1,03448276
	9	669,86667	669,86667	692,96552	692,96552	1,03448276	1,03448276
	15	669,86667	669,86667	692,96552	692,96552	1,03448276	1,03448276
	21	669,86667	669,86667	692,96552	692,96552	1,03448276	1,03448276
3	4	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
	10	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
	16	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
	22	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
4	43	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
	11	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
	17	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
	23	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
5	12	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
	18	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
	24	669,86667	669,86667	837,33333	837,33333	1,24999999	1,24999999
						Σn 25.05371	Σn 25.05371

(Sumber : Hasil Perhitungan)

837,33333

669,86667

25,0537063

25,05371

Tabel VII.7 Susunan tulangan geser balok terpasang di lapangan dan hasil hitungan portal as-E

Lantai	No. balok	Posisi balok	Susunan tulangan begel			
			Terpasang di lapangan		Hasil hitungan	
			Dalam sendi plastis	Diluar sendi plastis	Dalam sendi plastis	Diluar sendi plastis
B M	25	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	31	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	37	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
1	26	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	32	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	38	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
2	27	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	33	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	39	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
3	28	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	34	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	40	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
4	44	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	35	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
	41	Ki	2dp8-70	2dp8-200	2dp8-100	2dp8-205
		Ka	2dp8-70	2dp8-200	2dp8-100	2dp8-205
5	36	Ki	2dp8-150	2dp8-200	2dp8-80	2dp8-160
		Ka	2dp8-150	2dp8-200	2dp8-80	2dp8-160
	42	Ki	2dp8-150	2dp8-200	2dp8-80	2dp8-160
		Ka	2dp8-150	2dp8-200	2dp8-80	2dp8-160

(Sumber : Hasil hitungan)

Tabel V.4 Penulangan lentur balok dan momen tersedia balok portal as-E

Lantai	No. balok	Posisi balok	Momen perlu (KNm)		Susunan tulangan		Momen tersedia (KNm)	
			Negatif	Positif	Atas	Bawah	Negatif	positif
B M	25	Ki	108,8674	54,4337	4D20	3D20	115,74394	115,74394
		Lap	0	86,6996	3D20	3D20	88,89628	88,89628
		Ka	135,0683	67,53415	5D20	3D20	142,48542	142,48542
	31	Ki	129,6955	64,84775	5D20	3D20	142,48542	142,48542
		Lap	0	79,50856	3D20	3D20	88,89628	88,89628
		Ka	128,6224	64,3112	5D20	3D20	142,48542	142,48542
	37	Ki	134,5863	67,29315	5D20	3D20	142,48542	142,48542
		Lap	0	86,74212	3D20	3D20	88,89628	88,89628
		Ka	109,2644	54,6322	4D20	3D20	115,74394	115,74394
1	26	Ki	95,98468	47,99234	4D20	3D20	115,74394	115,74394
		Lap	0	92,54412	3D20	4D20	115,74394	115,74394
		Ka	136,2623	68,13115	5D20	3D20	142,48542	142,48542
	32	Ki	131,4825	65,74125	5D20	3D20	142,48542	142,48542
		Lap	0	78,69248	3D20	3D20	88,89628	88,89628
		Ka	128,4676	64,2338	5D20	3D20	142,48542	142,48542
	38	Ki	134,6268	67,3134	5D20	3D20	142,48542	142,48542
		Lap	0	92,76224	3D20	4D20	115,74394	115,74394
		Ka	97,1838	48,5919	5D20	3D20	142,48542	142,48542
2	27	Ki	85,35732	42,67866	3D20	3D20	88,89628	88,89628
		Lap	0	97,20856	3D20	4D20	115,74394	115,74394
		Ka	137,5606	68,7803	5D20	3D20	142,48542	142,48542
	33	Ki	132,3056	66,1528	5D20	3D20	142,48542	142,48542
		Lap	0	78,15184	3D20	3D20	88,89628	88,89628
		Ka	128,7258	64,36288	5D20	3D20	142,48542	142,48542
	39	Ki	134,2368	67,11842	5D20	3D20	142,48542	142,48542
		Lap	0	98,3912	3D20	4D20	115,74394	115,74394
		Ka	86,31568	43,15784	3D20	3D20	88,89628	88,89628
3	28	Ki	42,65132	21,32566	3D20	3D20	88,89628	88,89628
		Lap	0	100,0524	3D20	4D20	115,74394	115,74394
		Ka	133,5733	66,78664	5D20	3D20	142,48542	142,48542
	34	Ki	142,7288	71,3644	6D20	3D20	160,67777	160,67777
		Lap	0	76,25992	3D20	3D20	88,89628	88,89628
		Ka	122,0866	61,04328	5D20	3D20	142,48542	142,48542
	40	Ki	138,8855	69,44274	5D20	3D20	142,48542	142,48542
		Lap	0	104,8363	3D20	4D20	115,74394	115,74394
		Ka	68,77716	34,38858	3D20	3D20	88,89628	88,89628
4	44	Ki	81,3348	40,6674	3D20	3D20	88,89628	88,89628
		Lap	14,9922	20,3337	3D20	3D20	88,89628	88,89628
		Ka	0	0	3D20	3D20	88,89628	88,89628
	35	Ki	124,0446	62,02228	5D20	3D20	142,48542	142,48542
		Lap	0	84,61296	3D20	3D20	88,89628	88,89628
		Ka	124,0644	62,0322	5D20	3D20	142,48542	142,48542
	41	Ki	143,6161	71,80804	6D20	3D20	160,67777	160,67777
		Lap	0	104,0418	3D20	4D20	115,74394	115,74394
		Ka	65,63524	32,81762	3D20	3D20	88,89628	88,89628
5	36	Ki	35,87636	17,93818	2D20	2D20	46,75323	46,75323
		Lap	0	49,8282	2D20	3D20	75,31257	75,31257
		Ka	70,95748	35,47874	3D20	2D20	75,31257	75,31257
	42	Ki	74,81828	37,40914	3D20	2D20	75,31257	75,31257
		Lap	0	48,19488	2D20	3D20	75,31257	75,31257
		Ka	35,2822	17,6411	2D20	2D20	46,75323	46,75323

(Sumber : Hasil Hitungan)

Tabel V.8 Tulangan geser balok portal as-E

Lantai	No. balok	Posisi balok	Geser perlu (KN)		$V_{u,d}$	Tulangan begel			
			$V_{u,2}$	$V_{u,1}$		Sepanjang d		Diluar d	
						Perlu (mm^2)	Terpasang	Perlu (mm^2)	Terpasang
B M	25	Ki	99,4224	0	76,555248	603,70417	2dp8-100	419,0613	2dp8-205
		Ka	108,1572	11,202	85,857504	746,32457	2dp8-100	419,0613	2dp8-205
	31	Ki	103,9696	0	80,056592	663,8168	2dp8-100	419,0613	2dp8-205
		Ka	103,61	6,6548	81,310304	664,79386	2dp8-100	419,0613	2dp8-205
	37	Ki	108,0108	11,0556	85,711104	774,2228	2dp8-100	419,0613	2dp8-205
		Ka	99,5688	0	76,667976	605,32488	2dp8-100	419,0613	2dp8-205
1	26	Ki	97,0768	0	74,749136	577,73735	2dp8-100	419,0613	2dp8-205
		Ka	110,5016	13,4384	88,177064	779,63683	2dp8-100	419,0613	2dp8-205
	32	Ki	104,2912	0	80,304224	667,40728	2dp8-100	419,0613	2dp8-205
		Ka	103,2872	6,332	80,987504	660,21455	2dp8-100	419,0613	2dp8-205
	38	Ki	110,0304	13,0752	87,730704	773,21685	2dp8-100	419,0613	2dp8-205
		Ka	97,548	0	75,11196	582,95374	2dp8-100	419,0613	2dp8-205
2	27	Ki	95,088	0	73,21776	499,24696	2dp8-100	419,0613	2dp8-205
		Ka	112,4904	15,5352	90,190704	808,53342	2dp8-100	419,0613	2dp8-205
	33	Ki	104,3872	0	80,378144	668,47907	2dp8-100	419,0613	2dp8-205
		Ka	103,1924	6,2372	80,892704	675,04826	2dp8-100	419,0613	2dp8-205
	39	Ki	111,775	14,8208	89,475534	798,2661	2dp8-100	419,0613	2dp8-205
		Ka	95,8024	0	73,767848	506,73136	2dp8-100	419,0613	2dp8-205
3	28	Ki	81,8016	0	62,987232	419,0613	2dp8-100	419,0613	2dp8-205
		Ka	112,1088	15,1536	89,809104	803,05505	2dp8-100	419,0613	2dp8-205
	34	Ki	107,2296	10,2744	84,929904	733,00764	2dp8-100	419,0613	2dp8-205
		Ka	100,3488	0	77,268576	607,74582	2dp8-100	419,0613	2dp8-205
	40	Ki	115,4732	18,518	93,173504	851,35549	2dp8-100	419,0613	2dp8-205
		Ka	92,1052	0	70,921004	467,99755	2dp8-100	419,0613	2dp8-205
4	44	Ki	54,2232	27,1116	47,987532	419,0613	2dp8-100	419,0613	2dp8-205
		Ka	0	0	0	419,0613	2dp8-100	419,0613	2dp8-205
	35	Ki	103,7856	6,8304	81,485904	667,28497	2dp8-100	419,0613	2dp8-205
		Ka	103,7928	0	79,920456	645,65916	2dp8-100	419,0613	2dp8-205
	41	Ki	116,7868	19,8316	94,487104	870,21396	2dp8-100	419,0613	2dp8-205
		Ka	90,7928	0	69,910456	454,24815	2dp8-100	419,0613	2dp8-205
5	36	Ki	46,4408	0	35,759416	359,1954	2dp8-80	359,1954	2dp8-160
		Ka	58,1344	8,1448	46,636792	483,94054	2dp8-80	359,1954	2dp8-160
	42	Ki	58,8775	8,888	47,379915	497,84288	2dp8-80	359,1954	2dp8-160
		Ka	45,6988	0	35,188076	359,1954	2dp8-80	359,1954	2dp8-160

(Sumber : Hasil Perhitungan)

Tabel V.12 Penulangan geser kolom

Lantai	No kolom	Vu,k (kN)	Pu,k (KN)	Sepanjang l_0		Diluar l_0	
				Perlu (mm ²)	Terpasang	Perlu (mm ²)	Terpasang
B M	1	32,478	846,4507	598,659	2dp8-165	598,659	2dp8-165
	7	1,8016	1974,761	598,659	2dp8-165	598,659	2dp8-165
	13	1,916	2150,265	598,659	2dp8-165	598,659	2dp8-165
	19	32,594	1167,417	598,659	2dp8-165	598,659	2dp8-165
1	2	23,4232	627,7219	478,9272	2dp8-170	478,9272	2dp8-170
	8	1,1164	1574,57	478,9272	2dp8-170	478,9272	2dp8-170
	14	1,2844	1758,139	478,9272	2dp8-170	478,9272	2dp8-170
	20	23,594	937,8881	478,9272	2dp8-170	478,9272	2dp8-170
2	3	26,0732	416,5546	419,0613	2dp8-145	419,0613	2dp8-145
	9	1,2724	1181,75	419,0613	2dp8-145	419,0613	2dp8-145
	15	1,9108	1365,318	419,0613	2dp8-145	419,0613	2dp8-145
	21	26,7104	727,5208	419,0613	2dp8-145	419,0613	2dp8-145
3	4	21,7712	207,6955	359,1954	2dp8-120	359,1954	2dp8-120
	10	1,988	791,1418	359,1954	2dp8-120	359,1954	2dp8-120
	16	0,9632	974,7101	359,1954	2dp8-120	359,1954	2dp8-120
	22	20,7464	518,6621	359,1954	2dp8-120	359,1954	2dp8-120
4	43	0	115,5298	359,1954	2dp8-120	359,1954	2dp8-120
	11	8,5028	401,6016	359,1954	2dp8-120	359,1954	2dp8-120
	17	8,0436	585,1699	359,1954	2dp8-120	359,1954	2dp8-120
	23	16,548	310,9666	359,1954	2dp8-120	359,1954	2dp8-120
5	12	17,0224	103,271	359,1954	2dp8-120	359,1954	2dp8-120
	18	2,6428	195,6298	359,1954	2dp8-120	359,1954	2dp8-120
	24	19,6652	103,271	359,1954	2dp8-120	359,1954	2dp8-120

(Sumber : Hasil Perhitungan)

Tabel V. 10 Penulangan memanjang kolom portal as-E

Lantai	No kolom	Mu (KNm)		Pu (KN)		Mutu (Mpa)		b (mm)	h (mm)	d (mm)	Tulangan		Luas perlu (mm ²)	
		Arah X	Arah Y	Arah X	Arah Y	Beton	Baja				Arah X	Arah Y	Arah X	Arah Y
B M	1	3,28028	66,9266	846,4507	846,45072	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	7	1,39188	3,36428	1974,761	1974,7606	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	13	1,26868	3,88788	2150,265	2150,2649	22,5	278,4	500	500	440	6D25	6D25	2500	2500
	19	0,79952	66,8678	1167,417	1167,4169	22,5	278,4	500	500	440	6D25	6D25	2500	2500
1	2	2,94112	51,7553	627,7219	627,72192	22,5	278,4	400	400	340	4D25	4D25	1600	1600
	8	0,64744	2,45328	1574,57	1574,5702	22,5	278,4	400	400	340	4D25	4D25	1600	1600
	14	1,30692	3,06384	1758,139	1758,1385	22,5	278,4	400	400	340	4D25	4D25	1600	1600
	20	0,86136	51,9773	937,8881	937,88812	22,5	278,4	400	400	340	4D25	4D25	1600	1600
2	3	3,23096	49,633	416,5546	416,55456	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	9	1,47612	2,32624	1181,75	1181,7497	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	15	2,5466	3,78412	1365,318	1365,318	22,5	278,4	350	350	290	4D20	4D20	1225	1225
	21	1,6614	50,9534	727,5208	727,52076	22,5	278,4	350	350	290	4D20	4D20	1225	1225
3	4	4,89884	42,6513	207,6955	207,69552	22,5	278,4	300	300	240	5D16	5D16	900	900
	10	1,82408	4,15412	791,1418	791,14176	22,5	278,4	300	300	240	5D16	5D16	900	900
	16	2,97476	1,73976	974,7101	974,71008	22,5	278,4	300	300	240	5D16	5D16	900	900
	22	1,88592	39,3269	518,6621	518,66208	22,5	278,4	300	300	240	5D16	5D16	900	900
4	43	3,1934	0	115,5298	115,52976	22,5	278,4	300	200	240	3D16	3D16	600	600
	11	3,2316	17,3038	401,6016	401,6016	22,5	278,4	300	300	240	5D16	5D16	900	900
	17	3,41388	15,0593	585,1699	585,16992	22,5	278,4	300	300	240	5D16	5D16	900	900
	23	2,39008	30,1209	310,9666	310,96656	22,5	278,4	300	300	240	5D16	5D16	900	900
5	12	35,21664	35,8764	103,271	103,27104	22,5	278,4	300	300	240	5D16	5D16	900	900
	18	53,69696	5,6532	195,6298	195,62976	22,5	278,4	300	300	240	5D16	5D16	900	900
	24	28,46296	35,5144	103,271	103,27104	22,5	278,4	300	300	240	5D16	5D16	900	900

(Sumber : Hasil Perhitungan)

2943,75

1004,8